JPRS 78174

28 May 1981

China Report

SCIENCE AND TECHNOLOGY

No. 101

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 78174

28 May 1981

CHINA REPORT

SCIENCE AND TECHNOLOGY

No. 101

CONTENTS

PEOPLE'S REPUBLIC OF CHINA

PHYSICAL SCIENCES

Underwater Resonant Absorber Studied
(Zhu Weiqing; SHENGXUE XUEBAO, No 2, 1981).................... 1

Acoustical Holograms Used in Object Position Determination
(Zhou Zhiqing; SHENGXUE XUEBAO, No 2, 1981).................... 6

APPLIED SCIENCES

Development of Instruments, Meters Industry Reviewed
(Weng Dimin; YIQI YU WEILAI, Jan 81).......................... 12

Space Technology, Instruments, Meters Closely Linked
(Yang Jiachi; YIQI YU WEILAI, Jan 81)......................... 14

LIFE SCIENCES

Chromosome Aberrations in Oilfield Neutron Loggers Described
(Huang Quanguang, Shi Jilan; YICHUAN, No 1, 1981)............. 16

Crewman Miraculously Survives 400-Meter Ascent After Sub Disaster
(Yang Haijun; HANGHAI, 30 Mar 81)............................. 22

Briefs

Cancer Survey Launched 25
New Weapons Fight Meningitis 25

PUBLICATIONS

Table of Contents of 'XIBEI DIZHEN XUEBAO' No 1, 1980
(XIBEI DIZHEN XUEBAO, No 1, 1980)............................. 27

Table of Contents of 'ZHILIANG GUANLI' No 1, 1981
(ZHILIANG GUANLI, No 1, 1981).................................. 29

Table of Contents of 'NONGYE JIXIE' No 3, 1981
(NONGYE JIXIE, No 3, 1981)..................................... 31

Table of Contents of 'DIZHI LUNPING' No 5, 1980
(DIZHI LUNPING, No 5, 1980).................................... 32

ABSTRACTS

AERONAUTICS

HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE], No 4, Apr 81......... 34

BUILDING CONSTRUCTION

JIANZHU [BUILDING CONSTRUCTION], No 3, 81............................ 36

CEMENT PRODUCTION

SHUINI [CEMENT], No 4, 10 Apr 81.................................... 37

CONSTRUCTION EQUIPMENT

GONGCHENG JIXIE [CONSTRUCTION MACHINERY AND EQUIPMENT], No 4, 81..... 39

ELECTRONICS

DIAN SHIJIE [ELECTRICAL WORLD], No 2, 3, Feb 81...................... 40

GEOLOGICAL SURVEYS

GONGCHENG KANTAN [ENGINEERING SURVEYING], No 2, 81.................... 44

MACHINERY

JIXIE ZHIZAO [MACHINERY], No 3, 81.................................. 46

OCEANOLOGY

HAIYANG XUEBAO [ACTA OCEANOLOGICA SINICA], No 1, Mar 81.............. 47

PROSPECTING ENGINEERING

TANKUANG GONGCHENG [PROSPECTING ENGINEERING], No 2, 20 Apr 81........ 50

TECHNICAL STANDARDS

JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN], No 2, Mar 81.. 52

UNDERWATER RESONANT ABSORBER STUDIED

Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese No 2, 1981 pp 114-117

[Article by Zhu Weiqing [2612 4850 1987] of the Institute of Acoustics, Chinese Academy of Science: "Absorption Theory of Underwater Resonant Absorber"]

[Text] Received 13 October 1978

Abstract

In this paper we investigated the relation between absorption property of underwater resonant absorber and its geometric construction and dynamic mechanical property of rubber and obtained a group of expressions. With these expressions, and combined with experiments, we obtained good resonant absorbers.

Underwater resonant acoustical absorber consists of a perforated thin rubber sheet glued on a steel plate. It takes up very little space and has good acoustical absorption property in a certain frequency range. It is widely used in the acoustical structure of large sonar arrays and it can also be used as the liner for sound absorbing water pool. References (1) and (2) do not provide definitive relationship between the performance of resonant absorber and its geometric structure and the dynamic properties of rubber. In our study of this relationship, we obtained a set of compact expressions which, when combined with some simple experiments, allows us to develop the resonant absorber that we need. This paper treats the large holes of the resonant absorber and the radius of action associated with the large holes. The large hole and the rubber within the radius of action constitute a composite vibration system and they are the major components of the absorber.

I. Theoretical Expression and Experimental Study of Large Hole Admittance

For equally spaced holes the rubber surrounding each hole has the shape of a right hexagon and we will approximate this hexagon with a concentric exterior circle. Due to the axial symmetry, we can assume that for perpendicular incident acoustic waves no displacement exists in the radial direction r along the circumference of the circle. The radius b of the circle is the radius of action of the hole. We divide the large hole composite vibration system into two parts: a plate vibrator of thickness h on the hole and a cylindrical tube vibrator of length d, inner diameter a and outer diameter b.

For simply supported rubber plate vibrator the mechanical admittance can be written as

$$1/z_{c_{11}} = R_{11} + j\omega M_{11} + 1/j\omega C_{11} \tag{1a}$$

$$R_{11} = 19.1h^3E_1\eta_E/\omega\pi a^2 \tag{1b}$$

$$M_{11} = 0.64M_0, \quad M_0 = \pi a^2 h\rho \tag{1c}$$

$$1/C_{11} = 19.1E_1h^3/\pi a^2 \tag{1d}$$

where ρ is the density of rubber. The first order resonance frequency f_1 and the resonance bandwidth $2\Delta f$ of the circular plate vibrator are respectively

$$f_1 = \frac{0.83}{a^2}\sqrt{\frac{E_1h^2}{12\rho(1-\nu^2)}} \tag{2a}$$

$$2\Delta f/f_1 = \eta_E \tag{2b}$$

Using cylindrical coordinates and assuming axial symmetry and plane interception, we can apply the boundary conditions $r = a$, $\sigma_{rr} = 0$, $r = b$, $u_r = 0$ and obtain the axial effective elastic modulus $I_1(1 + i\eta_I)$ as follows

$$I_1\eta_I = \mu_1\eta_\mu(1+3\sigma^2)/\sigma^2 \tag{3a}$$

$$I_1 = \mu_1(1+3\sigma^2)/\sigma^2 \tag{3b}$$

$$\eta_I = \eta_\mu \tag{3c}$$

in which $\sigma = a/b$. Considering Rayleigh correction, we have the following equations when $\lambda >> \mu$

$$I_1\eta_I = \frac{\mu_1\eta_\mu}{\sigma^2}\left[1 + 3\sigma^2 + \frac{2k_{t_0}^2a^2g(\sigma)\mu_1/\lambda_1}{\sigma^2}\right] \tag{4a}$$

$$I_1 = \mu_1\left[\frac{1+3\sigma^2}{\sigma^2} - k_{t_0}^2a^2\frac{g(\sigma)}{\sigma^2}\right] \tag{4b}$$

where

$$g(\sigma) = \frac{\ln(1/\sqrt{\sigma})}{1-\sigma^2} + \frac{(\sigma^2-3)}{8}, \quad k_{t_0}^2 = \frac{\omega^2}{\mu_1/\rho}.$$

Mechanical admittance of the cylindrical tube vibrator can be written as

$$1/z_{c_{12}} = R_{12} + j\omega M_{12} + 1/j\omega C_{12} \tag{5a}$$

$$R_{12} = \frac{M_{02}}{2\rho}\left(\frac{\pi}{2d}\right)^2\frac{I_1\eta_I}{\omega} \tag{5b}$$

$$M_{12} = M_{02}/2, \quad M_{02} = \pi(b^2-a^2)d\rho \tag{5c}$$

$$C_{12} = \frac{1}{\frac{M_{02}}{2\rho}\left(\frac{\pi}{2d}\right)^2 I_1} \tag{5d}$$

and the first order resonance frequency and bandwidth are

$$f_1 = \frac{1}{4d}\sqrt{\frac{I_1}{\rho}} \tag{6a}$$

$$2\Delta f/f_1 = \eta_p \tag{6b}$$

Typical data[3] of the admittance of a large hole vibrator are given in Fig. 1 where the geometric parameters are $d = 4$ mm, $h = 2$ mm and $a = 2.5$ mm. ζgc_{1r} and ζgc_{1i} are respectively the input conductance and input susceptance of the large hole. The area ratio is $\zeta = N\pi b^2/S$, N is the number of holes and S the area of the absorber. Figure 1 shows that the large hole has two resonance frequencies. The optimum radius of action b_{op} and the optimum inner-outer radii ratio σ_{op} are found at the minimum of the average reflection factor $\check{\beta}$. Table 1 shows the relation between b_{op}, σ_{op} and temperature T under the same conditions as Fig. 1. As can be seen, $(S_{11}/S_{12})^2 = 0.1$ and can be neglected.

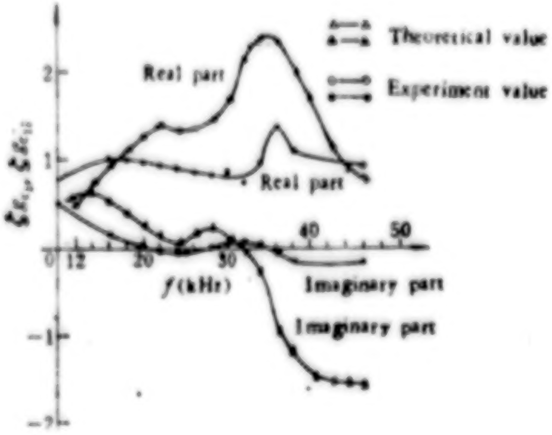


Figure 1. The admittance curve of large hole vibrator

Table 1. Relation Between b_{op}, σ_{op} and Temperature

Temp. 温度(℃)	15	20	25
b_{op}(mm)	4.5	5	6
σ_{op}	0.55	0.5	0.42

After extensive experiment and theoretical analysis, we developed resonant absorber[3] that has an acoustic absorption coefficient $\alpha = 96\%$ in the 10-60 kHz frequency range and $\alpha \geqslant 90\%$ in the 60-80 kHz range. We have also extended these results and developed an absorber with $\alpha = 90\%$ in the 30-120 kHz frequency range, see Fig. 3. All these absorbers are without small holes and easy to construct.

II. Discussions

From equations (1) and (5), we obtain the input conductance of a single large hole at $f = f_1$ and $f = f_2$:

$$g_{c_{11'}} \propto \sqrt{\frac{1}{E_1 \eta_E^2 \rho (1 - \nu)}}\, \sigma^2 \left(\frac{a}{h}\right)^2 \quad f = f_1 \qquad (7a)$$

$$g_{c_{11'}} \propto \sqrt{1/\mu_1 \eta_\mu^2 \rho} \cdot \sqrt{(1 - \sigma^2)^2 \sigma^2/(1 + 3\sigma^2)} \quad f = f_2 \qquad (7b)$$

Equation (3) is used in arriving at (7b). The right-hand sides of equations (7) consist of two parts, the part determined by the material parameters of rubber and the part determined by the geometric parameters. This is what we expected.

In order to maintain good matching, equations (7) show that as T increases σ must decrease. This is consistent with the data in Table 1 and also explains similar experimental results in references (1) and (2). It can be seen from (7) that in order to have $|\Delta\beta'| \leqslant 5\%$, the following condition must be satisfied

$$|\Delta(E_1 \eta_E^2 \rho)|/E_1 \eta_E^2 \rho \leqslant 20\% \qquad (8)$$

Equation (8) is close to experimental value and serves as an important criterion for material selection. When the factor $\sqrt{(1 - \sigma^2)^2 \sigma^2/(1 + 3\sigma^2)}$ in (7b) is plotted (see Fig. 2), the curve shows a maximum. Data in Table 1 and experimental value $\sigma = 0.495$ in references (1) and (2) are all very close to the σ value of the curve maximum. The physical significance is clear.

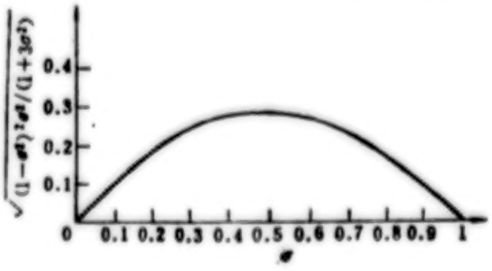


Figure 2. $\sqrt{(1 - \sigma^2)^2 \sigma^2/(1 + 3\sigma^2)}$ as a function of σ

Substituting the material parameters (including $\eta_\mu = \eta_E \simeq 1$) into (2a) and (6a), we have $f_1 = 26$ kHz and $f_2 = 34$ kHz, close to the experimental values in Fig. 1. From Fig. 1 we obtain the experimental values $2\Delta f/f_1 = 1$ and $2\Delta f/f_2 = 0.5$. The former is close to (2b) and the latter differs from (6b) somewhat. In the theoretical design for the tube vibrator, it is assumed that $\sigma_{rr} = 0$ at $r = a$; this is only partially satisfied so η_I should be smaller than η_μ. Equation (6b) should be changed to

$$2\Delta f/f_2 = 0.5 \qquad (9)$$

The above results also hold for a = 3 mm holes.

When we take into account the coupling between the two vibrators and neglect $(S_1/S_2)^2$, we then obtain the input admittance expression for a single large hole vibrator.[1] $\zeta\bar{g}c_1$ (see Fig. 1) is then obtained using equations (1), (2), (4), (5), (6), (9) and the experimental b_{op}. ζgc_{1r} has two resonance peaks, slightly higher than experimental values. ζgc_{1i} is more negative than the experimental value (close to zero) at high frequencies. This indicates that there are other vibrations higher than f_2. Experiment in water tank up to 80 kHz shows that α is still in the neighborhood of 90%; this also lends support to our assumption. The double vibrator model should be improved further.

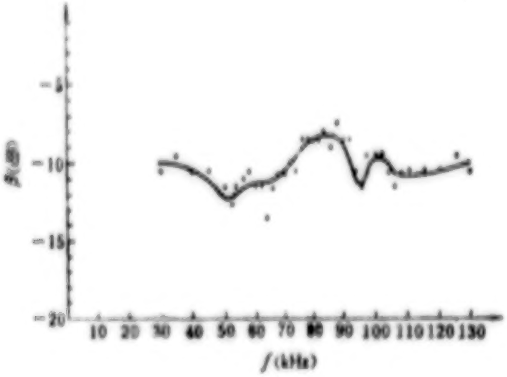


Figure 3. Relation between reflection factor and frequency. Geometric dimensions are d = 2 mm, h = 1 mm, a = 1.25 mm, and $\sigma = 0.5$

To broaden the range of application of the conclusions above, we now change the geometric parameters to d = 2 mm, h = 1 mm, a = 1.25 mm, distance between holes = 5 mm, σ_{op} is still 0.5 and the material is still rubber. Using (2), (6a) and (9), we calculated $f_1 = 50$ kHz and $f_2 = 93$ kHz and covered the 30-120 kHz range of the operating frequency. When the frequency is at f_1 and f_2, ζgc_{1r} is close to unity. Figure 3 shows the experimental results, and, in general, they agree with the prediction. Better results are expected with more fine tuning of the parameters. In conclusion, we have shown that resonant absorbers can be developed using the results presented here and with only modest amount of experimentation.

REFERENCES

1. E. G. Richardson, Technical Aspects of Sound, Elsevier Publishing Company, 1957.

2. E. Meyer and H. Oberst, "Resonanzabsorber fur Wasserschall", Acustica 2, Beih 3 AB, 149-170, 1952.

3. Joint Experimental Group of the Institute of Acoustics, Chinese Academy of Science, and the Tianjin Institute of Rubber Industry, "Underwater Resonant Absorber", 1967.

9698
CSO: 4008/302

PHYSICAL SCIENCES

ACOUSTICAL HOLOGRAMS USED IN OBJECT POSITION DETERMINATION

Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese No 2, 1981 pp 110-113

[Article by Zhou Zhiqing [0719 1807 3237] of Wuhan Institute of Physics, Chinese Academy of Science: "A Method of Determining the Object Position From Acoustical Holograms"]

[Text] Received 5 June 1979

Abstract

Object position can be determined if the reconstructed images of acoustical holograms are known. But obtaining the position of a reconstructed image is not as easy as it seems, either by optical reconstruction or by computer reconstruction. This paper describes a method of determining the object position directly from the fringe measurements of acoustical holograms of point objects and plane objects. The method can also be used to cylindrical objects if the elliptical fringes will be transformed into circular ones.

This method has two merits: firstly, it can get the object position directly without reconstruction; secondly, since the object position can easily be computed by fringe interval, it will make optical and computer reconstruction much easier.

In acoustical holography the hologram is produced with acoustic waves and the image is reconstructed with light waves. If the location of the object is known beforehand in the optical reconstruction, then the position of the image plane can be computed and the image of the object can be observed.[1] In the acoustic application of holography, however, the hologram is often used as a tool for searching and recognizing the target object and the object position is therefore unknown. Hence the focal plane of the image must be searched optically and once the image is established the object position can be computed from the image position. If computer reconstruction is used, it is also necessary to compute a series of positions to recognize the image position.[2] The sequence of establishing the object position is therefore from hologram to image position and to object position, a complex procedure. According to the fundamental theory of holography, the hologram preserves the object wave signal in its entirety. Is it possible to find some quantity on the hologram that is characteristic of the object position and thereby determine the object position directly from the hologram? Our study shows that this is possible for simple objects and this paper discusses this for several situations.

1. Point Object

For a point source with the normal incident plane wave as the reference wave, Fresnel zone plate is formed on the hologram plane with its center located at the perpendicular intersection from the point source to the plane and the zone plate has circular symmetry. In our discussion we choose an arbitrary plane that passes through the perpendicular and intersects with the receiving aperture, as shown in Fig. 1. The object point is at P, the hologram aperture linear measure is OA, the center of the zone plate formed by the point object is at x_0 and the distance between the point object and the hologram plane is z_0. The problem now is to determine the geometric position x_0 and z_0 of the object point by using the zone plate.

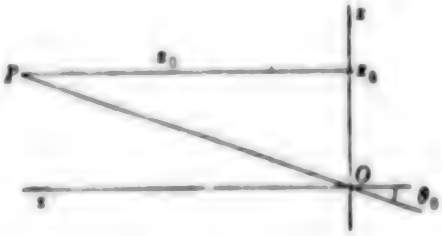


Figure 1. Hologram geometry of a point object

We choose an arbitrary point on the receiving aperture and calculate the space frequency at that point. For simplicity we take point O and the space frequency at O is

$$\nu_0 = (\sin\alpha_R - \sin\theta_0)/\lambda \qquad (1)$$

where α_R is the inclination angle of the plane reference wave to the hologram plane. For normal incidence, $\alpha_R = 0$. λ is the wavelength of the acoustic wave that produces the hologram and θ_0 is the angle of incidence of object point P at point O. Thus,

$$\nu_0 = -\sin\theta_0/\lambda = x_0/[\lambda(z_0^2 + x_0^2)^{1/2}] \qquad (2)$$

we can therefore calculate the width between interference fringes at point O. Let this width be d_1, we have

$$d_1 = 1/\nu_0 = \lambda(z_0^2 + x_0^2)^{1/2}/x_0 \qquad (3)$$

After rearrangement, (3) becomes

$$z_0 = (d_1^2 - \lambda^2)^{1/2} \cdot x_0/\lambda \qquad (4)$$

Assuming the distance between one fringe and its next nearest neighboring fringe is d_2, we obtain

$$z_0 = (d_2^2 - \lambda^2)^{1/2} \cdot (x_0 - d_1)/\lambda \qquad (5)$$

Solving (4) and (5), we get

$$x_0 = a_2 \cdot d_1/(a_2 - a_1) \quad (6)$$

$$z_0 = a_1 \cdot a_2 \cdot d_1/[(a_2 - a_1) \cdot \lambda] \quad (7)$$

in which $a_1 = (d_1^2 - \lambda^2)^{1/2}$ and $a_2 = (d_2^2 - \lambda^2)^{1/2}$. Equations (6) and (7) show that, once the distance between fringes is known, the position of the object point relative to the receiving aperture can be determined immediately. Since point 0 in the above calculation is chosen arbitrarily, the distance between any two fringes on the aperture can be used. The only precaution is that the origin of x_0 value is not at 0 but at the location of the fringe used in the computation. We use normal incident plane wave as our reference wave because it simplifies the situation. In actual applications it eliminates the need for a phase shift network and it is equivalent to a displaced reference for a searching system.[3] The derivation given above can of course also be done for a displaced reference, i.e., $a_R \neq 0$. It only makes the calculation somewhat complex. Also, if the hologram is reduced in size, equations (6) and (7) should be multiplied by the factor of reduction.

II. Plane Object

When a plane object is irradiated by an acoustic source, the reflection is mainly specular in the usual frequency range for ultrasonic holography. The acoustic waves received on the holographic plane is equivalent to the holographic plane irradiated directly by a virtual source through the object as a window, as shown in Fig. 2. The object P is irradiated by acoustic source S. The object waves on the holographic plane is equivalent to the Fresnel zone plate of a virtual source S' through window P. We choose x and z axes in Fig. 2 and reduce it to a two-dimensional problem as shown in Fig. 3. If the object is parallel to the hologram plane, the center of the zone plate is at S and the distance to the object is exactly one-half the distance from the hologram to the virtual source. The position of the virtual source can be found using equations (6) and (7). When the object is not parallel to the hologram, the virtual source will be displaced from S' to S_1' because the extension of the object is a perpendicular bisector of the line joining the irradiation source and the virtual source. When the object rotates about center P, the virtual source moves along the circumference of a circle of radius PS' centered at point P. The virtual source could be in the second quadrant or in the third quadrant depending upon the tilting direction of the object. On the hologram, the center of the zone plate moves from S to S_1. If the virtual source is located in the second quadrant of Fig. 3, the space frequency increases from S to 0. If the virtual source is in the third quadrant, then the space frequency decreases from S to 0. That is, as the object rotates and the virtual source moves from the second quadrant to the third quadrant, the space frequency on the hologram goes through a reversal. The greater the inclination angle between the object and the hologram, the farther away is the virtual source S_1' from S', and the object distance is no longer one-half the distance between the virtual source and the hologram. In order to find a computation method for the general case, we depict the geometric relations in Fig. 4.

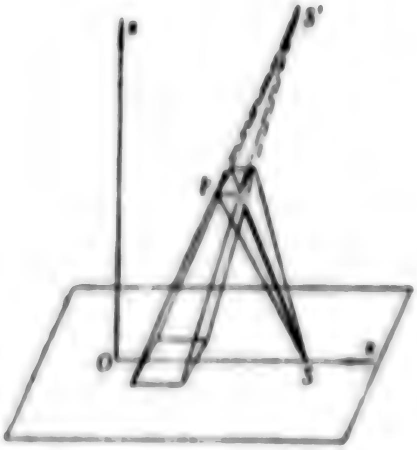


Figure 2. Virtual source of the plane object

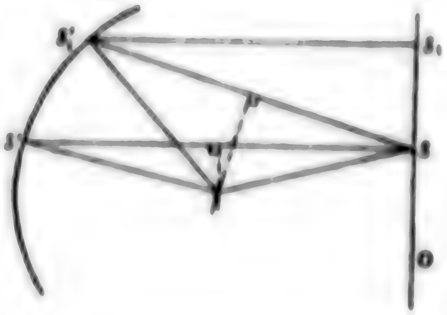


Figure 3. Relation between rotation of the object and virtual source

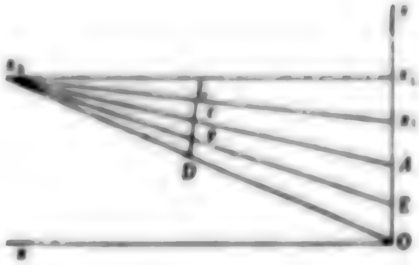


Figure 4. Hologram geometry of the plane object

Assuming the irradiation source is at x_1, the array aperture is OA and the linear dimension is L. Further assume that based on the recorded zone plate fringes, the zone plate center computed from (6) and (7) is at x_0 and the perpendicular distance of the virtual source from the hologram is z_0. From the discussion above we know that the plane object must be along the perpendicular bisector of z_0x_1 and, furthermore, since the image is received on the array, the object must fall within the range CD. We can therefore take the intersection of z_0E and CD as the position of the object and find the position of P (x_p and z_p) based on the known quantities x_0, z_0, x_1 and L.

From Fig. 4, we have

$$
\begin{aligned}
x_p &= z_0P \cdot \sin \angle x_0 z_0 E \\
&= z_0P \cdot (x_0 - L/2)/z_0E \qquad (8) \\
z_0P &= z_0x_1/2\cos \angle x_1 z_0 E \qquad (9) \\
\cos \angle x_1 z_0 E &= (z_0x_1^2 + z_0E^2 - x_1E^2)/(2z_0x_1 \cdot z_0E) \qquad (10)
\end{aligned}
$$

Substitute (9) and (10) into (8) and rearrange, we obtain

$$x_p = [z_0^2 + (x_0 - x_1)^2](x_0 - L/2)/[2z_0^2 + 2x_0^2 - 2x_0x_1 - (x_0 - x_1)L] \qquad (11)$$

Moreover, we also know

$$x_p = x_0 - x_0P \cdot \cos\angle x_Px_0E \qquad (12)$$

$$\cos\angle x_Px_0E = z_0/x_0E \qquad (13)$$

Substitute (9) (10) and (13) into (12) and rearrange, we get

$$x_p = [z_0^2 + x_0^2 - x_1^2 - (x_0 - x_1)L]x_0/[2z_0^2 + 2x_0^2 - 2x_0x_1 - (x_0 - x_1)L] \qquad (14)$$

As mentioned before, the virtual source may appear on the other side. In that case (11) and (14) still apply and the only precaution is that x_0 will be negative.

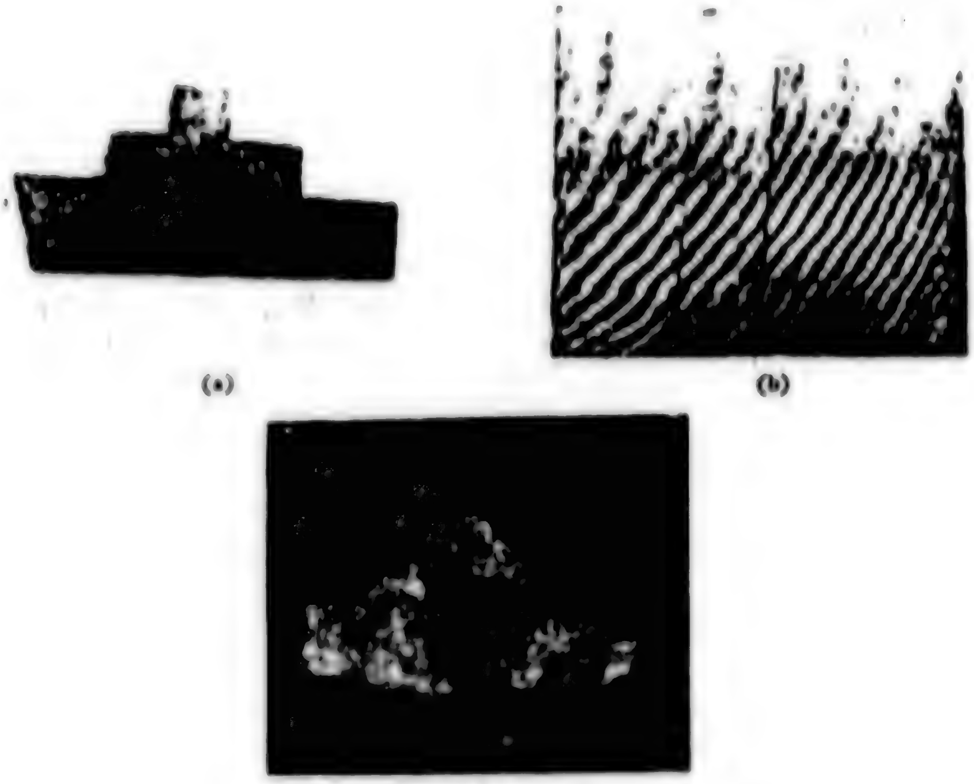
III. Complex Object

When a complex object is irradiated by an acoustic source, there is a collection of point source zone plates on the hologram. The hologram fringes may be quite complicated in this case and it is difficult to calculate the object position from the hologram. However, if the object has flat parts and corresponding virtual source zone plate fringes are relatively clear, the object position can still be found using the method discussed above.

Figure 5(b) is the hologram of a plane oject[3] that clearly shows the shape of a zone plate. Using readings obtained from the hologram negative with an optical projector, we calculated the perpendicular distance between the object and the receiving plane to be 17.2 m. (The result differs slightly using different fringes in the calculation.) The reconstructed image is shown in Fig. 5(c) and the object is shown in Fig. 5(a). The receiving aperture used in this experiment is 0.75 m, the measurement is performed under water with 1 MHz acoustic frequency and the object to hologram distance is measured to be approximately 18 m.

From the discussion above, one can see that for point objects, plane objects and certain other objects the object position can be directly computed from equations (6), (7), (11) and (14) based on the fringe interval of the zone plate. On the other hand, based on the calculated object position the optical reconstruction and computer reconstruction of the image can be made much easier.

The author thanks Professor Wei Baoe [7279 1405 6948] for his valuable suggestions and Mr Zhang Dejun [1728 1795 0193] for useful discussions.



(a) (b) (c)

Figure 5. A plane object, its hologram and reconstructed image. (a) plane object; (b) hologram; (c) reconstructed image

REFERENCES

1. B. P. (Hildebrandt) and B. B. (Brendon), "Acoustical Holography Theory", Scientific Press, 1978, p 27.

2. Yoshiao, Aoki., IEEE Transactions on Audio and Electroacoustics, AU-18, 258-367, 1970.

3. Zhou Zhiqing and Wei Bace, "Line Receiving Array Scanning Hologram and Some of Its Problems", Proceeding of the Second Chinese Conference on Acoustics, 1978.

9698
CSO: 4008/302

DEVELOPMENT OF INSTRUMENTS, METERS INDUSTRY REVIEWED

Beijing YIQI YU WEILAI [INSTRUMENTATION AND THE FUTURE] in Chinese No 1 Jan 81 pp 1-2

[Article by Weng Dimin [5040 6611 3046], Deputy Chief, Instruments and State Meters Industry Bureau. "Summing Up Experience to Develop the Instruments and Meters Industry"]

[Text] For the past 30 years, our country has, on the basis of developing a national economy in an independent and self-determining manner, built up an instruments and meters industry step by step. Now it has just achieved the appropriate scale to become an important technological tool for all trades and industries for technological reform and for realizing the four modernizations. It cannot be overlooked, however, that low quality, incomplete (product) lines, low completion rates of sets, blind repetition, and other manifestations are still a serious problem confronting production in the instruments and meters industry. Therefore, to develop rapidly the instruments and meters industry, we must sum up our experience, ascertain the direction, establish a foothold on the whole situation, and make unified arrangements. The following are my personal views on several problems:

1. The various departments of the national economy are an organic whole. Although instruments and meters are an important technological tool for development of the national economy, they generally cannot create wealth directly, but only when employed as part of a set including other mechanical products can they fully develop their role of promoting production. "Without skin, to what will the fur adhere?" Therefore we should, on the basis of the characteristics and practical requirements of our national economy, develop our instruments and meters industry so that it can achieve the objective of all-round and rapid development of the national economy.

2. The instruments and meters industry is a newly established industry with a high concentration of all types of science and technology, and with a close relationship to all new technology. To develop new types of instruments and meters, there would have to be a major effort to intensify scientific research. Without the backing of the research departments and higher level institutions, the instruments and meters industry would lose its vitality.

3. Instruments and meters have such characteristics as numerous categories, complex varieties, frequent modifications, as well as covering a broad technological spectrum. Therefore, a prefecture or city cannot do everything. Take advantage of what each area does best, and, on the basis of the economic structure and favorable conditions of the local area and make use of the situation, organize production, and develop traditional products. Only in this way can blind repetition be avoided so that the instruments and meters industries in all areas can play an even greater role.

4. The applications of instruments and meters are extremely broad: their quality directly affects industrial and agricultural production, the results of scientific research, and people's daily life. Therefore, with respect to the quality of various instruments and meters, the first word must be "exact," with constant effort to refine and perfect. The old way of going forward with a great noise with "neither blueprints nor data," was proved in practice to be incorrect. Concrete results can only be achieved by dealing with everything on a scientific basis, and in accordance with the facts.

5. Over 20 years of experience have proved that, to rapidly develop an instruments and meters industry with high quality, scientific management must be intensified, and technological talents must be developed energetically, so as to raise the technical level of management, production, and development. Beside developing talents from specialized schools, plant-sponsored schools, and from among incumbent cadres, another important course to follow is the bold selection of talents from among those actually in management and production. Only in this way can we adapt to the requirements of the developing situation.

In the march toward realizing the "four modernizations," we in the instruments and meters field are confronted by a large and complex task. We must put forth the greatest possible effort, grasping for time and struggling for speed so that we can, based on the practical requirements of the various departments of the economy, furnish top-grade, high-quality instruments and meters of various types, struggling to make even greater contributions to the development of the national economy.

8174
CSO: 4008/285

APPLIED SCIENCES

SPACE TECHNOLOGY, INSTRUMENTS, METERS CLOSELY LINKED

Beijing YIQI YU WEILAI [INSTRUMENTATION AND THE FUTURE] in Chinese No 1 Jan 81 pp 1-2

[Article by Yang Jiachi [2254 0857 1062], Deputy Director of the China Space Technology Research Institute: "Space Technology Cannot be Separated From Instruments and Meters"]

[Text] Space technology is a newly developed scientific technology. Its development is intimately related to instruments, meters, and test and measurement.

In general, a space vehicle includes an engine, a guidance and control assembly, energy source, temperature control, radio telemetry and remote control as well as other subsystems, and an instrumentation compartment for specific scientific research or application purposes. In the course of ground-level tests and actual flight of a space vehicle, it cannot be separated from various types of instruments and meters. In the development of a complete space vehicle, test and measurement expenses constitute a very large proportion.

A liquid propulsion engine is the motive power source of the space vehicle. In the course of development and testing, flow levels of fuel and oxydizing agent, combustion chamber, pressure and temperature, motive force of the engine, as well as the reaction vibration and other parameters of the various components must all be measured and recorded. Inasmuch as combustion is a high-speed process, the required response time of meters is within microseconds. To raise the credibility of the tests, the precision of the meters and test system must be raised.

A series of full-scale engineering experiments must be carried out in the course of the development of a space vehicle before its stability and reliability in space can be assured. Among them, the mechanical vibration test places the vehicle on a vibration platform where it is subjected to external shock with all types of instruments to measure the vibration. To ensure that man-made earth satellites can travel in orbit for long periods, cabin temperature must be maintained within a certain range and the vehicle must also be subjected to hot vacuum experiments. During the experiment, a full-scale model of the vehicle is placed in a vacuum to conduct measurement of interior cabin temperature using simulation test methods.

To launch a space vehicle into a predetermined orbit requires that the transport vehicle have a guidance and control system. Gyroscopes, speedometers, and other high-precision inertial meters are used to measure the orbit and attitude of the vehicle.

The part of scientific and earth observation satellites that attracts the most attention is the instrumentation cabin. The instruments in the cabin are specially designed on the basis of the requirements of dissimilar tasks. With respect to observations of space from space, instruments are employed which operate in various frequency spectra: radio, infrared rays, ultraviolet rays, X-rays, and Gamma rays. Through the measurements of these instruments, many new celestial bodies and astrophysical phenomena have been discovered. Some phenomena which could not exist on earth have also been discovered. Examples are the high energy particles as high as 10^{21} electron volts--produced by the super new stars in the universe. To produce such particles by the accelerator method now used to produce man-made high-energy particles would require a magnetic field with a diameter equal to twice the distance between earth and the sun.

In observations of earth from space, through various remote sensing instruments, not only can the earth's surface be inspected, but even the characteristics, shape, and changes through time of the various types of matter beneath the earth's shallow surface.

In the development of space science and technology, instruments and meters have already made important contributions. Further developments in space technology will promote achievement of even newer developments in instruments and meters.

8174
CSO: 4008/285

CHROMOSOME ABERRATIONS IN OILFIELD NEUTRON LOGGERS DESCRIBED

Beijing YICHUAN [HEREDITAS] in Chinese No 1, 1981 pp 9-11

[Article by Huang Quanguang [7806 2938 0342] and Shi Jilan [0670 4764 5695], Industrial Health and Safety Research Laboratory, Shandong Province Scientific Research Institute of Medicine, Jinan: "Preliminary Observations on Chromosome Aberrations in Oilfield Neutron Well Loggers"]

[Text] Early diagnosis and biological dose estimation are important links in the diagnosis of and protection against gradual radiation damage. Human chromosomes are highly sensitive to radiation, and there is a linear relationship between dose and chromosome aberrations, which can be used to detect early radiation damage and has promise as a sensitive "biological dosimeter." Currently many approaches consider chromosome aberrations as an excellent means of estimating the biological mutation coefficient. Work has been done in this country on biological effects of X-rays and gamma rays on humans, but there have been no reports of the effects of neutron damage on humans, and in particular on the production of chromosome aberrations in neutron well logging personnel. In order to investigate the degree of gradual radiation damage to the human body produced by neutrons and the relationship between chromosome aberrations in neutron loggers and their length of employment and type of occupation, the laws governing production and chromosome aberrations in chronic neutron irradiation and the relation to accumulated dose, in late 1975 we carried out preliminary chromosome aberration observations on 65 oilfield neutron logging personnel. The results are reported here.

Materials and Methods

The observations were conducted on a test group of 65 oilfield well logging personnel (including ground crew members, drivers and operators) and a normal control group of 50 subjects (8 oilfield workers and 42 blood donors at blood stations). The neutron loggers had no history of exposure to radiation other than neutrons. All of the neutron loggers were men, and their ages ranged from 18 to 42 with an average of 30. Their lengths of employment in occupations with exposure to neutrons ranged from 3 months to 13 years, with an average of 4.4 years. Other than some cases of low white cell counts, liver enlargement and high blood pressure, the subjects were in excellent health, and the great majority of them had normal white cell counts and platelet counts (the average white cell count was 6,351 per cubic millimeter and the average platelet count 166,900 per cubic millimeter).

Micro blood cultures were used for the chromosome samples. Since differences in culturing methods have a certain effect on chromosome aberration, we tried to standardize the procedures as much as possible. The cultures were made by the improved Moorhead method, and were in accordance with the World Health Organization's 1973 proposed standards.

We selected well-formed, medium dispersion cells in metaphase for analysis. Chromosome aberrations identifiable at the cytological level were divided into seven classes: polycentrics, rings, accentric rings, minutes (interstitial deletions or isochromatid deletions), interchanges, interbrachial transposition and end deletions. Only cells with 45 or 46 chromsomes were counted. Of the seven types of aberrations, end deletions (including chromosome breakage, fragments and deletions) are the product of a single hit, while the others are two-hit products. Internal replication, chromatid aberrations, polyploidy and gaps were not included as chromosome aberrations. Dicentrics had to be accompanied by a fragment. The chromosome aberration rate was calculated by counting single-hit aberrations as one aberration and two-hit aberrations as two aberrations; the formula used was: aberration rate = (total number of aberrations/number of cells observed) x 100.

Observation Results

The results of observations of chromosome aberrations in 50 normal, healthy subjects and 65 neutron logging personnel are given in Table 1. It can be seen from the table that in 3,448 metaphase cells in the 50 normal subjects, 3 chromosome fragments were found, and accordingly the calculated spontaneous chromosome aberration rate for the normal group was 0.087 per hundred cells. In the 7,051 metaphase cells from the 65 neutron logging personnel which were examined, the occurrence rates were: end deletions, 0.76 percent, dicentrics, 0.31 percent, minutes, 0.11 percent, internal replication 0.1 percent, translocation, 0.056 percent, gaps, 0.001 percent; and chromatid fragments, 0.28 percent, chromatid deletions, 0.06 percent; and chromatid exchange 0.001 percent. The number of chromosome aberrations observed in the 65 neutron logging personnel ranged from 0 to 13 per hundred cells; 39 of the neutron loggers, or 60 percent, had chromosome aberrations. The average chromosome aberration rate for the neutron loggers was 1.70 percent, 20 times higher than for the control group, a significant difference.

The relationships between chromosome aberrations and length of employment and type of occupation in the 65 neutron logging personnel are shown in Tables 2 and 3. Table 2 shows no tendency for the chromosome aberration rate to increase with length of occupation. However, the number of persons with chromosome aberrations (excepting those with less than 2 years' employment) also seems to increase with length of employment, and in particular 90 percent of the persons with 7 to 14 years of employment had chromosome aberrations. Table 3 shows a certain relationship between chromosome aberrations in the neutron loggers and the type of occupation. Drivers and ground crew members showed a significant difference. The chromosome aberration rate for ground crew members was higher than that for operators or drivers.

Table 1. Comparison of chromosome aberration rates for control group and neutron loggers

表1 正常人与中子测井人员. 染色体畸变率比较

类型 b 组别 a	检查人数 c	观察细胞数 d	染色体畸变 e					染色单体畸变			内复制 n	多倍体 o	染色体畸变率**/100细胞 p	染色单体畸变率*/100细胞 q
			双着丝点体 f	相互易位 g	微小体 h	末端缺失 i	间隙 j	缺失 k	断裂 l	互换 m				
正常 r 健康人	50	3448	—	—	—	3 0.087%	2 0.058%	—	5 0.14%	—	3 0.087%	159 4.6%	0.14	0.087
中子 s 测井人员	65	7051	22 0.31%	4 0.056%	8 0.11%	54 0.76%	1 0.001%	4 0.06%	20 0.28%	1 0.001%	7 0.1%	123 1.74%	0.35	1.70

Key:
a. Group
b. Type
c. Number of persons examined
d. Number of cells examined
e. Chromosome aberrations
f. Dicentrics
g. Interchanges
h. Minutes
i. End deletions
j. Gaps
k. Chromatid aberrations
l. Deletion
m. Breakage
n. Interchange
o. Internal replication
p. Polyploidy
q. Chromatid aberration rate per hundred cells**
r. Chromosome aberration rate per hundred cells*
s. Persons in normal health
t. Neutron logging personnel

Results of significance tests on the pairs of percentages: * There is an extremely significant difference between the chromosome aberration rates of the control group and the neutron logging personnel ($P < 0.01$). **There is a significant difference in the chromatid aberration rates for the two groups ($P < 0.0.$).

Table 2. Relationship between length of service and chromosome aberrations

表2 工龄与染色体畸变率之间关系

a 工龄(年)	b 人数	c 观察细胞数	d 畸变数	e 畸变率/100细胞	f 染色体畸变者	
					g 数	%
h 2年以下	11	972	25	2.57	7	63.6
2.5–4.0	35	3546	70	1.97	18	51.4
4.5–6.0	9	1119	13	1.16	5	55.6
7–14	10	1412	15	1.06	9	90

两个百分率显著性测验结果：4年以下与4年以上工龄者的染色体畸变有显著性差异(P<0.05)

Key:
a. Length of employment (years)
b. Number of persons
c. Number of cells observed
d. Number of aberrations
e. Aberration rate per hundred cells
f. Persons with chromosome aberrations
g. Number
h. 2 years or less

The results of significance tests on pairs of percentages: there is a significant difference between the chromosome aberration rate for length of employment for of 4 years or less and for employment of more than 4 years ($P < 0.05$).

Table 3. Relationship between occupation and chromosome damage

表3 工种与染色体畸变率的关系

a 工种	b 人数	c 观察细胞数	d 畸变数	e 畸变率/100细胞
f 操作员	5	387	3	0.78(1)
g 司机	6	975	16	1.64(2)
h 地面工	54	5689	104	1.8(3)

两个百分率的显著性测验结果：
(1) 与 (2): $P_t = 1.2 < 2$ ($P > 0.05$);
(1) 与 (3): $P_t = 2.1 > 2$ ($P < 0.05$);
(2) 与 (3): $P_t = 0.36 < 2$ ($P > 0.05$);

Key:

a.	Occupation	e.	Aberrations per hundred cells
b.	Number of persons	f.	Operators
c.	Number of cells observed	g.	Drivers
d.	Number of aberrations	h.	Ground crew personnel

Significance tests for pairs of percentages: (1) and (2): $P_t = 1.2<2$ ($P < 0.05$); (1) and (3): $P_t = 2.1>2$ ($P > 0.05$); (2) and (3): $P_t = 0.36<2$ ($P < 0.05$).

Discussion

1. Relationship between chromosome aberration rate in personnel coming into contact with neutrons and maximum permissible dose. In 1960 the International Council of Radiation Protection (ICRP) determined that the maximum permissible dose for the entire body or an important organ is 5 rem/year. Gorizontova et al. (1973) carefully analyzed the relationship between the aberration rate and maximum permissible dose and found that in 25 workers occupationally exposed to radiation who received an annual dose below the maximum permitted level there was no clear change in the chromosome aberration rate. In 7 such workers who received annual exposures above 5 rem the chromosome aberration rate was 2 to 3 times that for the control group. Brown et al. found no obvious chromosome aberrations in workers whose jobs exposed them to gamma radiation or neutron + gamma radiation below the maximum permissible annual dose. But many papers state that even if the received dose is below the maximum permissible dose, workers occupationally exposed to radiation show an increase in the chromosome aberration rate.

In the results of observations on the 65 oilfield neutron loggers shown in Table 1, the aberration rate is 20 times higher than for the normal group, a significant difference. What was the neutron dose which these well loggers received? In 1972 we carried out a health and safety survey on neutron loggers at a certain oilfield which indicated that the doses received by these workers were below the maximum permissible dose, and that workers with an average of 3 years' employment had received a total dose of 1.44 rem.

2. Relationship between chromosome aberrations and length of employment. Our research results given in Table 2 do not show any increase in the chromosome aberration rate with increased length of employment, but it appears that (with the exception of those with 2 years' or less service) there was a tendency for the number of persons showing chromosome aberrations to increase with length of employment: 90 percent of the personnel with 7 to 14 years' employment had chromosome aberrations. The average length of employment of the 65 neutron loggers examined was 4.4 years, with the majority having 2 to 4 years' employment. The number of chromosome aberrations observed in those with 4 years employment or less was higher than that for those with more than 4 years' employment, and those with 2 years' or less employment had even higher aberration rates (2.57 per hundred cells, a significant difference). Possible causes for this circumstance are: (1) we have no precise dose data because we still have not found a good neutron dose film (or instrument), so that it is hard to give an indication of the actual whole body dose received; (2) the chromosome aberration rates observed were generally low, and the number of cells analyzed, and in particular the number of cells analyzed per person, were very small (the average number of cells analyzed per person in the control group was 69, and the number analyzed for persons in the test group ranged from 43 to 430, with an average of 108), in addition to which radiation reactions clearly vary from person to person; (3) the dose accumulation rate of those subjected to radiation was very slow and was variable, and length of employment and degree of damage may not be positively correlated. Damaged chromosomes may be repaired or cells may be killed by the radiation, in addition to which the lymph nodes' dynamics are not clear and represent a complex factor in the repair and elimination of chromosome aberrations; (4) because individuals vary in their attitudes toward radiation protection and the actual amount of work done varies, the doses received also vary. In general, ground crew members who have

just started employment may have more opportunities to come in contact with neutron sources and accordingly receive larger doses.

3. Relationship between chromosome aberrations and occupation. Our results (Table 3) show that the aberration rate for ground crew members (1.8 per hundred cells) is higher than that for operators (0.78 per hundred cells), a significant difference. Because the ground crews' work involves primarily assembling and disassembling the neutron sources at the well head, and their opportunities to carry the safety receptacles are greater, the neutron dose received is rather large. The operators, on the other hand, are mainly responsible for operating the instruments and recording and analysis, and only occasionally participate in hand-carrying the receptacles and in the wellhead work. The drivers' chromosome aberration rate (1.64 per hundred cells) falls between those for the operators (0.78 per hundred cells) and the ground crew members (1.8 per hundred cells). But the rates for the drivers showed clear differences with those for both the operators and ground crew members. In addition to transporting the neutron sources, the drivers also take part in carrying the safety receptacles and in wellhead work, but their chances for exposure are smaller than those of the ground crew, and the doses which they receive while transporting the neutron sources are very small; accordingly their chromosome aberration rate falls between those for operators and ground crew. Because of variations in length of employment, radiation protection circumstances, number of persons observed and number of cells observed for the various occupations, it is rather difficult to make an analysis with any precision.

4. Types of chromosome aberrations. The chromosomes observed in 7,051 cells from the 65 neutron logging personnel were: chromosome deletions, dicentrics, minutes, interchanges, gaps, internal replication, and chromatid interchange, chromatid breakage, chromatid deletion and the like. Almost all of the types were observed. The occurrence rates were highest for chromosome deletion, dicentrics and minutes. In the 3,448 cells observed from the control group, other than 3 cases of end deletions and 3 cases of internal replication, there were also cases of chromosome gaps, chromatid breakage and polyploidy. There is considerable difference of opinion among investigators regarding the significance of chromosome shape aberrations. According to Bender and Prescott (1962), if before white cells are cultured they are irradiated during the G_0 period, and if the chromosomes have not replicated themselves, the radiation should not produce any chromosome aberrations. According to our observations, the chromosome aberration rate for the neutron logging personnel was 0.35 per hundred cells and that for the normal group was 0.14 per hundred cells. There is a significant difference between the two figures. In comparison with the control group, is there any relationship between occurrence of chromosome aberrations and gradual neutron irradiation? In the 7,051 mesophase cells from neutron logging personnel which we observed, there were seven chromosomes with internal replication, or 0.11 percent, but in the 3,448 cells from the control group which were examined there were also three cases of internal replication, or 0.087 percent, so that there is not a significant difference between the two.

8480
CSO: 4008/319

CREWMAN MIRACULOUSLY SURVIVES 400-METER ASCENT AFTER SUB DISASTER

Shanghai HANGHAI [NAVIGATION] in Chinese No 2, 30 Mar 81 pp 34-35

[Article by Yang Haijun [2799 3189 7786]: "To Save His Life"]

[Text] One winter day, somewhere in the East China Sea, a tense submarine-subchaser exercise was under way. Deep beneath the sea, a black submarine was quietly approaching the "enemy." Inside the submarine, the sailors were working especially intensely. The sonar operator was watching the target intently and calculating its position precisely. Suddenly, at an order from the commander, the torpedoman pressed the firing button, and a torpedo shot forth and struck the target. The commander immediately ordered a fast turn to avoid the enemy's search. The submarine rapidly left its attack location and headed for the deep sea.

On the surface, a transport taking part in the exercise was bringing ammunition and food to the unit according to a prearranged plan; it was unaware of the submarine which was then underwater, and the submarine was unaware of the presence of the transport. In the submarine, the commander gave the order to surface rapidly. The huge water tanks were blown by compressed air, and the submarine was rapidly rising to the surface, when suddenly the sonar operator discovered that a ship was directly above! The commander immediately ordered an emergency dive, but there was no time: with a loud boom, the control center of the submarine struck the transport's keel, a large hole was torn in the steel plates, and sea water boiled in, killing all of the personnel in the control center. The stricken submarine sank to the bottom. The rest of the crew immediately closed all of the watertight doors to the control center. They calculated that the ship's oxygen regeneration equipment could last for only 24 hours, and that they needed to organize an escape immediately. The crew swam out of the submarine one by one through a torpedo tube that was still intact. The submarine was then at a depth of 400 meters, and because there was no protective equipment, their bodies were fully exposed to the high pressure. The nitrogen in their tissues was likely to be brought to a high-pressure nitrogen equilibrium, existing only in a physical state within the body, dissolved in the tissues and blood, so that the body could not use it, thus presenting a hidden danger.

After the accident, a certain naval base immediately organized a rescue effort. The commanding officer ordered all ships carrying out missions at sea to immediately begin emergency rescue activities. An escort vessel was the first to find members of the submarine crew who had floated to the surface, and the sailors immediately manned lifeboats to rescue them. To their grief, they found that all of the submarine crewmen who had floated to the surface were beyond saving, and only corpses were pulled from the water. Suddenly they discovered that submarine crew member Huang Quan still had a slight pulse. The escort ship's medical orderly immediately began first aid, but nothing he did produced any improvement in young Huang's condition. Far off, one of our rescue ships received the report about Huang Quan. The medical officers aboard analyzed his condition and determined that Huang Quan was suffering from serious decompression sickness. Because the submarine crew, who had been subjected to a high pressure, had floated to the surface too fast, and the initial high pressure outside their bodies was rapidly removed, large amounts of the dissolved nitrogen in the body and in the blood was released as bubbles. These bubbles compressed the tissues, blood vessels and nerves, and even more seriously, the bubbles formed in the blood vessels threatened to act like stoppers and block the blood circulation, causing deprivation of nutrients and oxygen, edema, atrophy and necrosis of the affected tissue, and ultimately producing death. It was for this reason that some of the escaping crew members had lost their lives. Because Huang Quan's strength was limited and he had floated to the surface rather slowly, he had not died immediately.

At this point Huang Quan was still unconscious, and compression treatment had to be applied immediately. The escort ship had no compression equipment, and Huang's physical condition obviously did not permit his being once again submerged in the water, protected by another sailor, for natural compression treatment. The only possibility was to transfer him to a rescue ship as fast as possible for the treatment. The escort ship made a fast turn, and steamed ahead at its maximum speed of 28 knots. The rescue ship also increased its speed, doing its utmost to save Huang Quan's life.

They won the race with time, and as soon as Huang Quan was on the rescue ship he was taken to the compression chamber, for this was the only effective treatment. Increasing the pressure would gradually decrease the volume of the gas bubbles inside his body and dissolve them again in the body fluids and tissues, thus alleviating the deadly blockages and pressure, increasing the oxygen pressure in the tissues, and helping him to recover.

Inside the compression chamber, the high pressure caused the gas bubbles inside Huang Quan's body to dissolve again so that the pressure gradient between the nitrogen in his body and that outside was gradually relieved by blood circulation and respiration. After 7 hours had passed, Huang Quan was out of immediate danger, but his body had not yet recovered all of its capabilities and it appeared that the equipment aboard the rescue ship was inadequate for further treatment. Huang Quan had to be taken immediately to Shanghai, otherwise his condition might take a turn for the worse.

At 9 AM a silver gray fast naval launch sped off like an arrow toward Shanghai, carrying Huang Quan. At noon Huang Quan's respiration was labored, crushing pains in his chest became more severe, and his condition worsened. He soon lost consciousness, and his life was once again in great danger.

When it received the urgent report about Huang Quan's rescue, a certain naval hospital in Shanghai quickly made its preparations. At 1 PM, the launch moored at the Wusong docks, and Huang Quan was lifted into an ambulance and driven into Shanghai at 70 kilometers per hour. Inside the ambulance, Huang Quan's condition was steadily worsening, and his survival depended on time.

The doors to a large compression chamber in the naval hospital were opened. A rescue crew quickly worked out a treatment. Obviously the worsening of Huang Quan's condition was because the decompression sickness had become more serious, and the limited treatment on the rescue ship was unable to make the gas bubbles in his body dissolve completely in the body and the blood, so that blockage and pressure again resulted. He had floated up from a depth of 400 meters, and accordingly the class 3 treatment for decompression sickness produced by a depth of over 100 meters had to be used. An older medical officer with many years' experience in medical treatment determined that only by subjecting Huang Quan to three compression treatments of different intensities could they thoroughly eliminate the gas bubbles from his body; otherwise, even if they were able to save Huang Quan's life, irreversible pathological changes or even paralysis might result. Huang Quan's unconsciousness indicated that the gas bubbles had already gravely affected blood vessels in the thoracic region, and that the compression treatment must be started immediately.

The first treatment was completed, and there was no essential change in Huang Quan's condition. It was clear to everyone that correct application of the compression treatment was the key to overcoming the sickness. After the second treatment was complete, Huang Quan's condition began to improve, but his body had not yet recovered all of its capabilities. The medical officers inside the compression chamber took readings painstakingly, and some of them suffered nosebleeds because of the high pressure of the chamber, but they paid no attention; everyone's sole concern was saving Huang Quan's life. The third treatment was completed. The last nitrogen bubble in Huang Quan's body dissolved in his blood, and the crisis was past. All of the bodily dysfunctions resulting from blockage by gas bubbles ceased. The doctors' examination showed that he was fully normal. The treatment was successful, and Huang Quan's life had been saved. The door to the compression chamber was opened, and as Huang Quan opened his eyes and saw the people around him, he let fall a glistening tear.

8480
CSO: 4008/320

LIFE SCIENCES

BRIEFS

CANCER SURVEY LAUNCHED--For the purpose of carrying out a preventive policy of protecting the health of women, the medical units of various ranks of the city of Beijing have performed a general survey of gynecological diseases of more than 1.040 million women, stressing cervical cancer. Cervical cancer is one of the malignant tumors seriously threatening the health and life of women. It ranks first or second of all malignant tumors of women. In order to strengthen its prevention, the city began in 1973 to examine all married women once every 3 years. Combining with the program of general periodical surveys, victims of cervical cancer have been provided with timely treatment as soon as the disease is discovered. Within the city limits, the incidence of the disease in 1973-75 was 99/100,000. In 1977-79, during the 2nd cycle of the survey, it dropped to 48/100,000. Among the victims discovered during the 2nd survey cycle, 61 percent were in the early stage and 13 percent were in the late stage. Early discovery, early diagnosis, and early treatment have basically provided a cure for early stage cervical cancer, while those of the intermediate stage have also been given an opportunity for early treatment and the lives of most of them saved. Meanwhile, various types of gynecological diseases discovered during the general surveys are also being treated. In order to do a good job surveying, the Municipal Center of Health Protection for Women and Children first organized five training classes of vaginal cytology to train a staff of more than 400 persons in every district of the city. A rudimentary cancer prevention network was thus established. During this period of time, some hospitals dispatched 30 surgical teams to the rural villages to treat uterine prolapse in women. The workers' associations of many units and many women's alliances also eagerly cooperated with this project. They help propagandize the significance of the general surveys, and preventive and treatment results to be continuously improved. [Xian Jing [0103 2529]] [Text] [Beijing BEIJING RIBAO in Chinese 10 Mar 81 p 1] 6248

NEW WEAPONS FIGHT MENINGITIS--The purified vaccine for epidemic cerebrospinal meningitis recently certified by the Ministry of Public Health is a product of successful research of Beijing Research Institute of Biotic Products of the Ministry of Public Health with the cooperation of related organizations. This fruit of scientific research filled a void in China. It has become "a new weapon" to defeat epidemic cerebrospinal meningitis at the advanced level of the world. Epidemic cerebrospinal meningitis is an infectious disease with a relatively high rate of incidence. The victims are mostly children of 1-15 years of age and the mortality rate is rather high. Beijing Research Institute of Biotic Products began to carry out the research in 1972 and since then has continued to investigate the subject with Institute of Microbiology and Epidemiology of Chinese Academy of Medical Sciences, the center of inspection of Pharmaceuticals and Biotic Products of the Ministry of Public Health, the Dezhou District Public Health and Epidemic Prevention Station of Shandong Province, etc. The comrades of the Cerebrospinal Meningitis Group of the Vaccine Office the Glossy Ganoderma [Ganoderma lucidum] Group of Yeast Office, and the Department of Epidemiology and the Department of Inspection and Certification of the Beijing Research Institute of Biotic Products, who concretely undertook the task of scientific research of this project performed close to 1,000 experiments in a spirit of selflessness and finally succeeded in 1974 in producing China's first purified vaccine for epidemic cerebrospinal meningitis. The chief of the group, Wang Liya [3769 4539 0068] who was over 50 years of age, gave himself the first injection of the vaccine to start the human experiment stage of the project, and he was able to experience the reaction to the vaccine personally. From 1976 to 1980, 49.4 million doses of the purified vaccine have been provided by the research institute to give out more than 10 million immunizations. Judging from the results of such a large quantity of human data, after the vaccine enters the human body, the reaction is slight and the serum antibodies increase four to five fold. The mean rate of protection of human groups is 82.14 percent. Generally, immunity occurs in a half a month or shorter period of time after the vaccine is injected. [Chen Xuhad [7115 4872 6275]] [Text] [Beijing BEIJING RIBAO in Chinese 10 Mar 81 p 1] 6248

CSO: 4008/274

PUBLICATIONS

TABLE OF CONTENTS OF 'XIBEI DIZHEN XUEBAO' NO 1, 1980

Lanzhou XIBEI DIZHEN XUEBAO [NORTHWESTERN SEISMOLOGICAL JOURNAL] in Chinese Vol 2 No 1, 1980 pp 101-102

[Text] General Condition of the Development of Early Seismic Investigation in China......Li Shanbang (1)

Classification of Nine Strong Earthquakes in Recent Years in China......Ma Zhongjin [7456 1350 2516] and Yang Maoyuan [2799 2021 3293], both of the Analysis and Forecasting Center, State Seismological Bureau (6)

On Modulator Model of the Short-term and Prequake Forecast ......Guo Zengjian [6753 1073 1696], State Seismological Bureau; Qin Baoyan [4440 0202 3601], Lanzhou Institute of Seismology (18)

Diagrams of Simple Regional Values in General Activities of Strong Earthquakes......Li Yongshan [2621 3057 0810], Fan Yumin [5400 0068 3046] and Li Zhengping [2621 2398 1627], all of the Shaanxi Seismological Bureau (27)

Tibetan Mid-focus Earthquake and Its Structural Significance ......Yan Jiaquan [6768 1367 0356] and Jia Sujuan [6328 4790 1227], both of the Institute of Geophysics, State Seismological Bureau (36)

Strong Earthquakes and Deep Structures in the Ningxia Region ......Chen Sugai [7115 4790 2395], Ningxia Hui Autonomous Region Seismological Team (42)

On Characteristics of Seismic Gaps before the Great Earthquakes......Lu Dehui [0712 1795 1798], Li Suqin [2621 4790 1830] and Chen Ailing [7115 1947 3781], all of the Lanzhou Seismological Institute, State Seismological Bureau (48)

Discussion on the Developmental Process Prior to the Helinger Earthquake from Its Early Foreshocks......Liu Yuehe [0491 2588 0735], Nei Monggol Seismological Team (55)

Preliminary Summarization of the Precursors of the 4.7 Magnitude Lixian Earthquake, 25 July 1979 in Gansu......Comprehensive Study Section of Seismic Activities, Gansu Provincial Bureau of Seismology (60)

On the Relation between Earthquakes and the Crustal Thickness of Variational Zone......Zheng Wenqing [6774 2429 0615], Lanzhou Institute of Seismology (66)

Research Reports in Brief

Discussion on the Superimpositional Anomalies of Earthquake Precursors......Yang Zhirong [2799 1807 2837], Xinjiang Uygur Autonomous Region Seismological Bureau (73)

Time Characteristics of Strong Earthquake Occurrence in the Qinghai-Tibetan Plateau......Guo Yaping [6753 0068 1627], Qinghai Seismological Bureau (78)

Partial Improvements on the Measuring Method of Radon Content in Groundwater in Earthquake Prediction......Yang Mingde [2799 2494 1795], Lanzhou Institute of Seismology (82)

Landslip and the Change of Radon Content in Groundwater...... Xu Yuhua [1776 3768 5478], Lanzhou Institute of Seismology (85)

Review and Prospects

The Vibroseis System--A Prospective New Technique in Research on Earthquake Prediction......Feng Deyi [7458 1795 4135], Lanzhou Institute of Seismology (89)

Research Notes and News

Discussion on the Sudden Drop of Radon Content in Wushan Hot Spring Prior to the 5.4 Magnitude Heishui Earthquake...... Wang Zhangling [3769 7022 1545], Lanzhou Institute of Seismology (94)

Measurement of the "Minimum Value" of Magnetic Declination by the Indigenous Geomagnetic Method and Strong Earthquakes ......Ma Yusheng and Guo Xiuzhen (97)

Verification of the Tianshui Earthquake of 19 March 734 in Gansu......Li Qun and Wu Huanying (99)

Verification of the Epicentral Location of the Tianshui Earthquake of 19 March 734 in Gansu......Xie Yuanting and He Yuting (100)

9717
CSO: 4008/273

TABLE OF CONTENTS OF 'ZHILIANG GUANLI' NO 1, 1981

Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 1, 1981 p 1

[Text] The First Annual Meeting Has Been Held by the China Association for Quality Control...... (1)

Basic Contents and Requirements of TQC (1)...... (2)

Vigorously Promote TQC Centering on Escalation of Production Quality...... (6)

An Elementary Introduction to Quality Assurance...... (8)

Review TQC Practice in Our Factory...... (11)

Discussion of Process According to Tolerance Middle Value...... (14)

Using P Control Chart to Control Casting Quality...... (16)

Checking Working Quality, Raising Transportation Efficiency of Storage Battery Car...... (19)

Adopting Design of Experiments to Raise Finished Casting Gear Quality...... (21)

Using A-E Method with Frequency Table to Calculate Normal Deviation...... (23)

Simplified Calculation of Average Value X and Standard Deviation S...... (28)

Rules for Rounding Off Numerical Values...... (29)

Simplify Formula of Calculating Process Ability Index...... (30)

Flexible Application of QC Seven-Tools...... (32)

The Origin of the Normal Distribution Curve Function Formula...... (33)

Application of Normal Distribution Addition Theorem in Production...... (37)

Toyota-type Production System and QA...... (40)

Symposium on Basic Methods (7). Introduction...... (42)

QC Discussion

Promotion Process of Quality Control...... (46)

9717
CSO: 4008/291

PUBLICATIONS

TABLE OF CONTENTS OF 'NONGYE JIXIE' NO 3, 1981

Beijing NONGYE JIXIE [FARM MACHINERY] in Chinese No 3, 1981 p 40

[Text] Some Suggestions on Energy Policy and Energy Saving for Farm Machinery...... (2)

New Developments in Farm Machinery: Nine Items...... (3)

Discussion...... (5)

New Products: Mounted Type Scraper Series for Farm Use...... (11)

A Poultry Farm Invested In, Operated and Profited from All in One Year......Ni Lu [0242 1774], Shanghai Institute of Agricultural Machinery (12)

Recent Developments in Science and Techniques: Five Items...... (14)

Using Solar Energy and Bio-gas to Heat Early Rice Seedling Greenhouse...... (15)

How to Use Power Driven Rice Transplanter Safely...... (19)

Great Possibilities in Existence for Saving Electricity in Farm Use Pumps...... (22)

CO_2 Gas Shield Cold Welding of Cast Iron with Flux in Groove...... (28)

On Maintenance...... (33)

On Repairing and Manufacturing...... (36)

Advertisement--Model XY-150 XY-200 Pneumatic Conveyor by Jiexiu County Chengzhen Drier Factory, Shanxi Province...... (40)

9717
CSO: 4008/277

TABLE OF CONTENTS OF 'DIZHI LUNPING' NO 5, 1980

Beijing DIZHI LUNPING [GEOLOGICAL REVIEW] in Chinese No 5, 1980 pp 375-376

[Text] A Preliminary Study on the Stratigraphical Distribution and Zoogeographical Provinces of Paleozoic Tabulate Corals in China......Lin Baoyu [2651 1405 3768], Institute of Geology, Chinese Academy of Geological Sciences (377)

On the Genetic Mechanism of Kimberlite and Diamond......He Guanzhi [6320 3487 0037], Institute of Geology, State Seismological Bureau (384)

A Plumbous Varlamaffite......Ma Renkua [7456 0088 1401], Region One Survey Team, Hebei Geological Bureau; Zhang Jianhong [1728 1696 3163], X-ray Laboratory, Wuhan Geological College; Chen Keqiao [7115 0344 2881], Institute of Mineral Geology, Chinese Academy of Geological Sciences (392)

Some Characteristics of the Spilite-Keratophyre Series in Zhangbaling of Eastern Anhui......Li Yingyun et al. (397)

A Preliminary Study on the Characteristics of the Yudongzi-type Ferruginous Formation and Genesis of Magnetite Quartzite in Southern Qinling, Shaanxi......Feng Benzhi [7458 2609 2535], Yang Tianqi [2799 1131 1142] and Yang Dianfan [2799 3013 5400], all of Changchun Geological College; Wang Mingjia [3769 2494 1367], Lin Shimin [2651 0013 2404], Wu Guoxing [0702 0948 5281] and Zhao Jian [6392 0256], all of the Fourth Geological Team, Shaanxi Bureau of Geology (405)

A Preliminary Study on the Characteristics of Silver Mineralization in the Zhanggongling Lead-Zinc-Silver Ore District, Guangxi......Hang Changsong [2635 7022 2646], Guangxi Zhuang Autonomous Region Institute of Geology (414)

The Ancient Bronzes and Tin Deposits of China (continued)......Wen Guang [5113 1639], Chinese Academy of Geological Sciences (420)

Discussions

Indosinian Movement in the Lower Changjiang Region...... Deng Yonggao [6772 3057 7559], Wu Ruitang [0702 3843 2768] and Xin Jianrong [6580 1696 2837], all of Wuhan Geological College (430)

A Quantitative Mineralogical Classification and Nomenclature of Alkaline Intrusive Rocks......Min Gaoren and Luan Qinghe (436)

Preliminary Study of Genesis of a Sort of Siliceous Rock ......Li Wenheng [2621 2429 1854], Jiangxi Institute of Coalfield Geology (442)

Main Economic Types of Lead-Zinc Deposits in Hunan Province ......Li Hongchang [2621 3163 2490] and Tang Xianli [0781 0341 4409], both of Team 408, Hunan Bureau of Geology (446)

Review

A Monograph of Regional Petrology--Geochemistry of Granites in South China......Su Zongwei [5685 1350 0251], Science Press (451)

Scientific Communications

Research Information on Stromatolites......Liang Yuzuo and Xiao Zongzheng (452)

Some Basic Guides to Prospecting Covered Coal Fields...... Zhao Longye [6392 7127 2814], Chinese Academy of Geological Sciences (454)

On "Haiqin" (Marine Transgression) and "Haijin" (Marine Immersion)......Zhao Xiwen [6392 6932 2429], Wuhan Geological College (456)

Notes

Discovery of Late Cambrian Zhangshanian Trilobite in Qingshuihe, Nei Monggol......Zhang Jinlin [1728 6651 2651], Tianjin Institute of Geology and Mineralogy (457)

Technology and Methodology

An Example of Storage and Retrieval of Geological Data...... Yu Zhijun [0060 1807 6874], East China Petroleum College (459)

9717
CSO: 4008/265

AUTHOR: None

ORG: None

TITLE: "Airplane Strength Specification"

SOURCE: Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese No 4, Apr 81 pp 2-3

ABSTRACT: Airplane strength specification is an important document that provides guidlines for airplane design and certification. It specifies the design requirements for structural loading, static strength, fatigue and fracture strength, rigidity, vibration characteristics, and other special parameters in order to ensure airplane safety and performance. The first airplane strength specification was published in Germany in 1916. During the past few decades, accumulation in design experience and advancement in aeronautical science resulted in several major revisions in airplane strength specifications. Currently, most industrialized nations follow the following common practices in developing their airplane strength specifications: 1) incorporation of design experience and new technology; 2) establishing research organizations dedicated to writing specifications; 3) establishing special agency with authority to

continuation of HANGKONG ZHISHI No 4, Apr 81 pp 2-3

review and certify specifications; 4) recent trend to develop unified specifications among Western European nations; 5) developing specialized specifications for fixed-wing military airplanes, rotary-wing airplanes, and civil transport airplanes.

AUTHORS: LIU Kan [0491 0170]
LI Chunyu [2621 2504 3768]

ORG: None

TITLE: "Joint Tactical Information Distribution System"

SOURCE: Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese No 4 Apr 81 pp 6-7

ABSTRACT: The Joint Tactical Information Distribution System (JTIDS) is a modern military command system designed to coordinate the maneuvers of Air Force, Navy, and Army in a tactical operation. The system primarily uses digital techniques for voice communication, data transmission, navigation, discrimination, and traffic control. Most communication links are time division multiplexed so that thousands of users can share the same frequency channel. The main features of a Joint Tactical Information Distribution System are: 1) high degree of flexibility in network configuration; 2) simultaneous information exchange on the same frequency band; 3) access to wide range of information gathering capability by each user in the network; and 4) ability to communicate with satellite Global Positioning System.

AUTHOR: FENG Xiencheng [7458 3759 2052]

ORG: None

TITLE: "Dangerous Electromagnetic Waves"

SOURCE: Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese No 4, Apr 81 pp 8-9

ABSTRACT: In a modern air defense system, "fire control radar" is a key component which controls the firing and guidance of surface-to-air missiles, anti-aircraft guns, and air-to-air missiles. By emitting radio waves to search and track its targets, the radar can direct defensive missiles to lock onto invading airplanes and destroy them. To counteract these dangerous radio waves, the airplane must be equipped with electronic counter measure devices which can identify the radar parameters and issue warning signals to the pilot to take active or passive protective actions. The radio waves are also dangerous to the radar itself because they can be used by the guidance system of an invading missile to home in on the radar. In this article, several examples of tactical engagement between defensive radars and attacking airplanes which occurred during the Vietnam war, and the 1967, 1973 mid-east wars are described.

3012
CSO: 4009/262

AUTHOR: ZHANG Wei [1728 4850]

ORG: None

TITLE: "Architectural Designing and Conservation of Energy Resources"

SOURCE: Beijing JIANZHU [BUILDING CONSTRUCTION] in Chinese No 3, 81 p 24

ABSTRACT: In order to produce ideal results of energy conservation, reasonable overall planning beforehand is much more effective than reconstructing a building in a later date. For example, according to statistics provided by Liaoning Provincial Institute of Architecture, if a 37-brick wall is changed to a 49-brick wall in the designing stage, the increase in the construction cost may be reclaimed in 15 years from energy savings, and if the useful life of a brick stucco building is estimated to be 60 years, 3/4 of the savings are net benefits. Aside from the structure of the building, the architectural design should include considerations of electric, water, and gas equipment of the building to make the design favorable for controlling energy consumption, such as providing individual meters for each family. Lastly, the paper emphasizes the need for legislation to require all buildings to be designed in such ways as to stop waste of energy.

AUTHOR: XIAN Zhaorui [0752 0340 3843]
SUN Zhaoqian [1327 3564 0467]
HUANG Guding [7806 6253 0002]

ORG: None

TITLE: "Yinchuan--a Newly Risen City on the Border"

SOURCE: Beijing JIANZHU [BUILDING CONSTRUCTION] in Chinese No 3, 81 pp 26-27

ABSTRACT: Yinchuan, the capital of Ningxia Hui Nationality Autonomous Region, has always been known as Jiangnan [the valley south of Changjiang] on the Border. Today, with the diligent labor of a vast number of construction workers, it has become a newly risen industrial city. The urban area is now 5 1/2 times as large, compared with the size before the liberation, and is linked with Beijing and all other parts of the country by a railway and an airline. The city has more than 300 light and heavy industries and a population of 3 million Hui, Han, Meng, and Mian Nationalities. In the past 3 years, 9 residential buildings have been completed every month, on the average. There are museums, exhibition halls, libraries, cultural centers, lighted ball fields, swimming pools, ice skating rinks, etc. distributed in all parts of the city, and a park in the northwestern corner. The 3 streams of Tanglai, Hanyan, and Huinong, which were excavated as early as Qin and Han Dynasties to connect the city with Huanghe continue to nourish the land to make this a fertile home of rice and fish. A photo of a segment of the new city of Yinchuan is included in the description.

6248
CSO: 4009/269

Cement Production

AUTHOR: PEI Shouping [5952 1343 1456]

ORG: Shanxi Provincial Bureau of Construction Materials

TITLE: "Comprehenisve Utilization of Gangue to Develop Cement Production"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 4, 10 Apr 81 pp 24-27

ABSTRACT: Shanxi Province is known to be the home of coal and a large quantity of gangue is being piled up like mountains in many places of the province to create an extremely dangerous situation. At present, very little of the gangue is utilised. Some research studies and production practices have proved the feasibility of using gangue to produce cement. This paper reports the chemical composition of gangue of major coals of Shanxi Province, the chemical composition of the clinker made from limestone, gangue, iron file, and clay, the physical properties of clinker containing gangue, and the physical strength and property of cement with the clinker refired in the kiln after adding gangue and gypsum, based upon laboratory analyses.

AUTHOR: CHENG Zhicheng [4453 1807 2052]

ORG: Cement Plant of Xuzhou Mining Bureau

TITLE: "Using Gangue to Replace Clay in the Material Mixture"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 4, 10 Apr 81 p 28

ABSTRACT: The cement plant is a subsidiary of Xushou Mining Bureau of Jiangsu Province. Since Oct 79, on the basis of using wet rotary kiln (ϕ 2.5/2.0 x 57 m)technique, the plant has been replacing clay with gangue entirely. The quality of the clinker is improved, compared with the original clay mixture,and the cement product has rated above No 630. The coal consumption is lower and and the useful life of the kiln is lengthened as well. A table listing the industrial analysis and the chemical composition of the gangue and the clay it replaced is included. The ratio of limestone, gangue, iron powder, and coal ash in the raw material and the chemical composition are reported. The process of calcining the raw material containing gangue to produce clinker is also briefly introduced.

AUTHOR: None

ORG: Nanhai Cement Plant, Fushan District, Guangdong Province

TITLE: "Experimental Production of Volcanic Ash Silicate Cement Using Gangue to Make the Raw Material Mixture"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 4, 10 Apr 81 pp 29-31

ABSTRACT: Guangdong Provincial Research Institute of Construction Sciences cooperated with the Nanhai Cement Plant to carry out experiments on gangue cement. After certain favorable results were obtained, the plant carried out test production of 1340 tons of gangue cement of a quality above No 300. Most of the cement products were used in water conservancy construction of farming fields and the results have been satisfactory. The coal mines near the Nanhai Cement Plant produce a large quantity of gangue which takes up a great deal of land to store. Experimental analyses indicate the aluminum oxide content of the gangue to be greater than 20 percent. The economic benefits of using gangue to replace clay are also considerable. Experimental data of the effects of different calcining temperatures on the limestone absorption rate of the gangue and the strength of the cement are reported, as well as other laboratory analyses data. The cement production process adopted by the plant is briefly introduced.

6248
CSO: 4009/268

Construction Equipment

AUTHOR: ZHANG Fumin [1728 4395 3046]

ORG: None

TITLE: "Improvements to the Structure of the Gearbox of the 2.5 Ton Truck"

SOURCE: Tianjin GONGCHENG JIXIE [CONSTRUCTION MACHINERY AND EQUIPMENT] in Chinese No 4, 81 pp 16-17

ABSTRACT: In the operating process, the rotary oil seal of the clutch in the gearbox of the 2.5 ton JZ425 truck made by the Tianjin Municipal Vehicle Repair Plant breaks down regularly. To repair it, the entire clutch assembly must be taken apart first. This is very inconvenient for the users. This paper analyzes the possible reasons for the oil seal to be so easily damaged. On the basis of not altering the structure and the major components of the original gearbox, the paper proposes to replace the original oil seal of a diameter of ø80 with one of ø35, in addition to making some other minor changes. These recommendations have been proved in experiments and in production to be feasible as well as effective.

AUTHOR: LI Changzhong [2621 7022 1813]
ZHANG Qingfeng [1728 7239 1496]

ORG: None

TITLE: "A Discussion of Several Problems Regarding the Operation and Repair Aspects of D80A-12 Bulldozers"

SOURCE: Tianjin GONGCHENG JIXIE [CONSTRUCTION MACHINERY AND EQUIPMENT] in Chinese No 4, 81 pp 45-49

ABSTRACT: The authors began to use the D80A-12 bulldozers in 1976. The natural condition of the work site is rather special, being arid, windy, and cold while the machine is not very well understood. Some individual bulldozers did perform 6000 hours of work continuously, most others required major repair and parts replacement after about 3000 hours of work. The authors gathered experiences of other users of this machine in addition to their own understandings gained in the process of repairing these bulldozers to arrive at some conclusions concerning diagnoses of the troubles and ways of repairing and preventing them. These conclusions are discussed at length in the paper.

6248
CSO: 4009/265

Electronics

AUTHOR: LIU Shisheng [0491 4247 2573]

ORG: Shanghai Institute of Power Generating Equipment Assembly Designing

TITLE: "New High Efficiency Method of Generating Electricity--Fuel Cell"

SOURCE: Shanghai DIAN SHIJIE [ELECTRICAL WORLD] in Chinese No 2, Feb 81 pp 1-2

ABSTRACT: The theory of fuel cell was proposed more than a century ago, but it was not until the late 50's before various countries of the world began to study its application. In China, its research began in the early 60's. A 40 w fuel cell was made in 1974. When 90 of these are linked together power is generated at 850°C. The fuel gas is hydrogen; the oxide is oxygen; the positive electrode is nickel; the negative electrode is silver; the electrolyte is 90 percent ZrO_2 and 10 percent Y_2O_3; and the average power density is 80 mw/cm². Its useful life is very short, however. later,an improved single fuel cell was made to have a power density of 100 mw/cm², with a useful life of 1000 hours. Aside from a brief description of its development in China, this paper also introduces the basic theory of fuel cell, its advantages, its application in space vehicles, and the condition of research of high temperature fuel cells in the USA, Japan, and W. Germany.

AUTHOR: LI Yida [2621 0076 6671]

ORG: East China Electrical Power Management Bureau

TITLE: "Sealing Off Cable Hole Can Prevent Fire From Spreading"

SOURCE: Shanghai DIAN SHIJIE [ELECTRICAL WORLD] in Chinese No 2, Feb 81 p 18

ABSTRACT: On 6 Dec 79, a fire broke out at the Sanming Bureau of Power Supply, Fujian Province. The condenser layer was punctured during operation of the current mutual inductor to cause the oil to be quickly overheated and exploded. The inductor oil gushed into the cable run below to set the cable on fire. All the cable outside the building was burned. Fortunately, the cable hole where the cable run entered the main control room had already been sealed, according to the stipulation of Article 63 of the High Voltage Power Installation Designing Regulation of the Ministry of Electrical Power. The sealed hole and the fire wall prevented the fire from spreading into the main control room. This paper reports the accident and reminds all bureaus of power supply to learn a lesson from it.

AUTHOR: ZHAO Yuanbi [6392 0337 1732]

ORG: None

TITLE: "China's Largest Wind-powered Power Generator"

SOURCE: Shanghai DIAN SHIJIE [ELECTRICAL WORLD] in Chinese No 2, Feb 81 p 24

ABSTRACT: According to the statistics of the weather bureau, in Shengsi Islands of the East China Sea, the wind speed averages 7.1 m/sec all year long. In 1977, a windmill generator designed by East China Power Designing Academy and Zhejiang Provincial Research Institute of Machines was installed on a hill there. This windmill, the FD-13, starts when the wind speed is 4 m/sec; power is generated at a wind speed greater than 4 m/sec; when the wind speed is 8 m/sec 18 kw of power is generated. To date, the windmill has produced several thousand hours of electricity, used mainly for lighting, operating water pumps, and desalination of sea water. The paper includes a brief description of the windmill generator, and a photo of the windmill with a man standing by it.

AUTHOR: TAN Shaoming [6223 1421 2494]

ORG: None

TITLE: "Wujiang Ferry Hydroelectrical Power Station"

SOURCE: Shanghai DIAN SHIJIE [ELECTRICAL WORLD] in Chinese No 2, Feb 81 p 32, front cover

ABSTRACT: Wujiang Ferry Hydroelectrical Power Station is located in Zunyi County of Guizhou Province, on the main channel of Wujiang near the [Si]chuan-Qian [Guizhou] Railway. The equipment is designed to generate 630,000 kw of electricity to be transmitted to Guiyang and Zunyi power network on 220 kv and 110 kv cables respectively. The plant behind the dam measures 106.6m in length, 20.5m in width, and 56m in height, to hold 3 turbine generators of a capacity of 210,000 kw each. The first of these was completed in 1979 and has been in operation since. It is hoped that the other two will soon be finished also. A photo of the hydroelectrical power station appears on the front cover of this issue of the journal.

AUTHOR: JIA Hongbin [6328 7703 2430]

ORG: East China Electrical Power Designing Academy

TITLE: "Prospect of Development of Nuclear Power Stations in China in the 80's"

SOURCE: Shanghai DIAN SHIJIE [ELECTRICAL WORLD] in Chinese No 3, 81 pp 1-2

ABSTRACT: The energy sources of China's power stations are mainly coal and water, with very few oil fired stations. Hydroelectrical power is located mainly in the West and the South; coal is produced mainly in the Northwest and the North. As a result, there is an energy deficiency in the industrially more developed coastal region, while coal and petroleum are important chemical raw materials too valuable to burn. Using the fission energy of U^{235} to produce power is not sufficiently efficient, however. If U^{235} is used to transform thorium into Pu239, one ton of uranium can become the equivalent of one million tons of coal. China has plenty of thorium to make this technique very promising. Of course, if thermonuclear fusion can be controlled to produce electricity, the condition will be totally different. Considerations discussed in the paper also indlude the problem of what to do with a nuclear power plant after its useful life of 40 years, building nuclear power stations in the densely populated coastal region, and other safety problems.

AUTHOR: LIU Zhen [0491 7201]

ORG: Power Usage Division, Rugao Power Supply Bureau, Jiangsu Province

TITLE: "Brief Discussion of Marsh Gas Power Generation in Rural Villages"

SOURCE: Shanghai DIAN SHIJIE [ELECTRICAL WORLD] in Chinese No 3, 81 p 6

ABSTRACT: This paper explains that diesel engine for agricultural use and hand-held diesel tractor can be easily converted into a generator using a mixture of oil and marsh gas as fuel to produce electricity. They can preserve their functions for plowing or transportation. At night, or during a slack season, they may be used as a generator to provide the needed electric power. In Rugao County, 74 marsh gas tanks have been built specially for this purpose. The total volume of these tanks is about $2100m^3$, having a power producing capacity of 110 kw. A marsh gas tank in normal production condition can run a generator of 8 kw capacity for about 6 hours, sufficient for the needs of lighting, milling, and pumping water. Small tanks of not more than $50m^3$ each are recommended. The paper also briefly introduces methods of purifying the marsh gas and converting the 195 Model diesel engines.

AUTHOR: None

ORG: Technological Research Office, Shanghai Power Supply Bureau

TITLE: "Digital Control of Silicon Controlled Transverter"

SOURCE: Shanghai DIAN SHIJIE [ELECTRICAL WORLD] in Chinese No 3, 81 pp 8-9

ABSTRACT: Large power silicon controlled transverters, i.e. rectifier and inverter devices have now been extensively used in departments of metallurgy, chemical engineering, transportation, machinery, electric power, national defense, scientific research etc. but the transverter is a harmonic source and in the process of operation it will affect the quality of the electrical power supply. Harmonic waves produced by the silicon controlled transverter may be divided into 2 categories: The specific or theoretical harmonic wave can generally be absorbed by a tuner wave filter device. The nonspecific harmonic wave is produced mainly by the anisometric characteristic of the various bridge arms in the transverter. The most economical method to reduce or eliminate it is to improve the transverter control system. This paper introduces a new type of digital trigger circuit, which includes mainly an isometric pulse generator, a lock phase frequency multiplying synchronous pulse generator, trigger pulse power amplifier, etc. Each of these components of the digital control system of the transverter is briefly described.

6168
CSO: 4009

AUTHOR: FANG Hongqi [2455 7703 3825]
MIAO Xinguan [5379 1800 1401]
ZHAO Shudong [6392 2885 2767]

ORG: All of Survey Technology Research Institute, Chinese Academy of Construction Sciences

TITLE: "Seismological Mechanism and Effects of Tangshan Earthquake--Preliminary Research Concerning the Tangshan Active Fault Zone"

SOURCE: Beijing GONGCHENG KANTAN [ENGINEERING SURVEYING] in Chinese No 2, 81 pp 1-6

ABSTRACT: Due to the fact that there was no obvious foresign, the 7.8 magnitude earthquake of Tangshan on 28 Jul 76 produced very diastrous results. The extensive geomorphological changes brought about by the earthquake and historical geological expressions all indicate repeated movements of fault activities. For the purpose of providing the necessary bases of designing engineering structures in terms of earthquake prevention and resistance in the future, this paper discusses the tectonic background of severe earthquakes, the horizontal and vertical changes and the ground strain in a severe quake area, the mechanism of earthquake occurrence, and the ground surface effects of faults. Several maps and drawings are included to depict subsidences and uplifts in the Tangshan plain, distribution of aftershocks, locations of fault sections, etc.

AUTHOR: None

ORG: Hubei Comprehensive Surveying Academy

TITLE: "Brief Introduction of the Multiple Applications of the DJ-1 Laser Device"

SOURCE: Beijing GONGCHENG KANTAN [ENGINEERING SURVEYING] in Chinese No 2, 81 pp 34-35

ABSTRACT: The authors reconstructed the large levelling instrument made in E. Germany (the OFD leveler) by adding a collimating optical system made by the Surveying Academy and a helium-neon laser device to produce the DJ-1 laser instrument. It operates through eye observation or by laser. It can point the direction for the transit. It is a leveling instrument, and may also be used for vertical projection. It is especially useful in relatively dark sites, at night, in an underground project, in a mine shaft, or in a not very well lighted machine shop, for example. The structure, characteristics, technical parameters, method of application, and degree of precision of this reconstructed instrument are introduced. There are also 2 photos depicting 2 views of the instrument.

AUTHOR: QU Zhiming [1448 2535 7686]

ORG: Xi'an Surveying Company, Ministry of Metallurgy

TITLE: "An Appraisal of the Ground Water Resources of Xiaochaidan Basin"

SOURCE: Beijing GONGCHENG KANTAN [ENGINEERING SURVEYING] in Chinese No 2, 81 pp 65-69

ABSTRACT: Xiaochaidan Basin is a small intermountain basin of an arid inland region [Qinghai Province]. According to the nearby Dachaidan Weather Bureau data, the annual rainfall is 83mm and the evaporation is 2178.4 mm. There is only one stream, Tatalinghe, which originates from Dakundaban Mountains and empties into Xiaochaidan Lake, which is a highly mineralised salt lake in the southwestern corner of the basin. The basin is surrounded in the south, sorthwest, and northeast by medium high mountains of Presinian metamorphic rocks, with Tertiary mudstone mountains in the west and loose Quaternary deposits in the center. Following calculation of hydrological equilibrium factors (equations of the transfer relationship of the stream, the lake, and the ground water) and the quantity of ground water mined from the existing wells, it is the opinion of the author that if 30,000m^3/day of ground water is mined within the basin, some of the reserve water will be used during the dry season, but it is entirely possible that the reserve will be restored in the same year. This amount of mining will not cause problems of quality deterioration and other ill effects of the ground water in the basin.

AUTHOR: SHEN Yucheng [3088 5940 4453]

ORG: Surveying Company of the Fifth Ministry of Machine Industry

TITLE: "Research and Manufacture of the YSC-300 Total Hydraulic Water Well Drill"

SOURCE: Beijing GONGCHENG KANTAN [ENGINEERING SURVEYING] in Chinese No 2, 81 pp 79-80, 77

ABSTRACT: Since 1972, the company has carried out the project of studying and manufacturing the YSC-300 total hydraulic water well drilling machine. The prototypes have undergone 4 revisions through the various experimental and testing stages. It has now been officially certified by the ministry and small batch production has started. The structural theory, the property characteristics, and the test results of this drilling machine are given. It has been demonstrated that the machine is completely suitable for all types of strata and is judged to be a modernized water well drilling equipment. A photo of the drilling machine and a schematic drawing depicting its structural theory are included.

6168
CSO: 4009/263

Machinery

AUTHOR: WANG Jimin [3769 3381 3046]

ORG: Shanghai Research Institute of Materials

TITLE: "Improving the Useful Life of Diecasting Molds"

SOURCE: Shanghai JIXIE ZHIZAO [MACHINERY] in Chinese No 3, 81 pp 11-13

ABSTRACT: Although there is insufficient statistics on China's diecasting production and mold consumption, judging from partial local survey data, in the country as a whole, molds consume 500-1000 tons of steel every year. Compared with foreign data, the condition is in need of serious improvement. The stress on the mold should be reduced while its heat and fatigue resistance should be raised. Seven aspects of approaching the objective of lengthening the useful life of diecasting molds are discussed. Following a comparison of several types of alloy steel mold-making materials, the paper introduces briefly the HY-10 copper alloy mold-making material, which is the product of joint research of Shanghai Research Institute of Materials and several other organizations.

AUTHOR: FU Xishou [0265 6932 1108]

ORG: None

TITLE: "Improving the Shape of Steel Ball Type Valve, Valve Opening"

SOURCE: Shanghai JIXIE ZHIZAO [MACHINERY] in Chinese No 3, 81 pp 19-20

ABSTRACT: Steel ball type valve in a hydraulic system is known for the merit of being simply constructed and having no danger of becoming stuck, but there is no or very little damping action and its high frequency vibration may easily damage the valve opening to cause it to lose its sealing property. This paper explains how this problem may occur. If in the process of forming the opening, a ϕ18 ball is used to make an impression 0.5mm in depth to form the external opening before a ϕ12 ball is used to make an impression 0.2mm in depth to form the internal edge of the opening the problem may be effectively resolved. Details of this improved work process are described.

6248
CSO: 4009/266

AUTHOR: TANG Yingwu [0781 2019 0710]

ORG: Institute of Acoustics, Chinese Academy of Sciences

TITLE: "Average Sound Intensity in Shallow Water with Positive Sound Velocity Gradient and Randomly Fluctuating Surface"

SOURCE: Beijing HAIYANG XUEBAO [ACTA OCEANOLOGICA SINICA] in Chinese Vol 3 No 1, Mar 81 pp 70-78

TEXT OF ENGLISH ABSTRACT: Assuming that shallow water with a positive sound velocity gradient has a rough surface, the change of surface height is a stationary stochastic process with Gaussian distribution. The normal modes which can reach the receiver are summed up according to energy, and an expression for the average intensity is then obtained by averaging over the source and receiver depth within the turning depth of pseudo-plane waves corresponding to these normal modes. Theoretical results are in good agreement with experimental data. The structure of the sound field in the case of a quiet sea surface is given as a special case of a rough surface.

AUTHOR: CHEN Song [7115 2646]
LIAO Wenzhuo [1675 2429 0587]
XU Xibin [6079 3305 3453]

ORG: All of the Third Institute of Oceanography, National Bureau of Oceanography

TITLE: "A Kinetic Study of the Extraction of Uranium from Seawater by Titanic Gel. I. Measurement of the Activation Energy of Adsorption--A Method Directly Used for Natural Seawater"

SOURCE: Beijing HAIYANG XUEBAO [ACTA OCEANOLOGICA SINICA] in Chinese Vol 3 No 1, Mar 81 pp 79-85

TEXT OF ENGLISH ABSTRACT: Some previous works and our experimental data have shown that the adsorption process of uranium on the titanic gel in seawater could be treated by using Langmuir's theory of monolayer adsorption. A method for determining the activation energy of adsorption is proposed based on this theory with some simplifying assumptions in connection with the characteristics of the adsorption process--low velocity of adsorption, long time to reach equilibrium, and low percentage extraction. By using this method, the activation energy of uranium adsorbed on the titanic gel in natural seawater has been determined and found to be about 10 kcal/mol.

[Continuation of HAIYANG XUEBAO Vol 3 No 1, Mar 81 pp 79-85]

The essential point of this method is that, after a given short time of adsorption t, the adsorption capacity X is proportional to the adsorption velocity constant K, for different temperatures, in connection with the Arrhenius equation:

$$\log K_1 = -\frac{E}{2.303R}\left(\frac{1}{T}\right) + B,$$
$$\log X = -\frac{E}{2.303R}\left(\frac{1}{T}\right) + B'.$$

This equation can be used for the determination of the activation energy of adsorption from the adsorption capacity X after a definite short time of contact with seawater, thus enabling us to determine the activation energy of the adsorption process. It seems that this simple and useful method can be extended to the measurement of activation energy of adsorption of some other micro-elements in seawater.

AUTHOR: CAI Shuiyuan [5591 3055 3293]
ZHUANG Mingjiang [5445 2494 3068]
ZHENG Wenqing [6774 2429 1987]

ORG: All of the Third Institute of Oceanography, National Bureau of Oceanography

TITLE: "Exploration of AHP Resin Synthesized in the Aqueous Phase and Its Adsorption Mechanism of Uranium"

SOURCE: Beijing HAIYANG XUEBAO [ACTA OCEANOLOGICA SINICA] in Chinese Vol 3 No 1, Mar 81 pp 86-96

TEXT OF ENGLISH ABSTRACT: AHP resin organic adsorbent for extraction of uranium from seawater which was synthesized in the aqueous phase with tetraethylene pentamine (TEPA), epichlorohydrin (ECH) and C-reagent as the raw material and rubber solvent oil (120 gasoline) as the pore-producing agent is recommended here. The characteristics of the resin are: (1) It has a great exchange capacity: 20-40 mesh of wet sample was able to adsorb stably over 900 μg U/g dry resin through which fresh seawater was passed for 15 days (the average adsorption capacity of five sets of the sample was 1163 μg U/g dry resin, but 1560 μg U/g dry resin was the highest degree of adsorption among the samples); (2) It has a high exchange rate: a gram of the resin was able to absorb about 80 μg of uranium every day; (3) It has a good selection and a high extraction rate and is less affected by the temperature of seawater; (4) It is reusable: there was a set

[Continuation of HAIYANG XUEBAO Vol 3 No 1, Mar 81 pp 86-96]

of samples which had been used 12 times and the average adsorptior capacity was 620 μg U/g dry resin and the loss by solution was about 5.6 percent; (5) It has a lower mechanical strength and a higher loss on dissolving: the loss by solution in the first period of use was about 20 percent. This sort of resin has never been reported before.

Based on the empirical theory that the reaction mechanism of chelate high polymers could be modeled on that if its similar substance with fewer molecules, we used the MPS-5000 spectrophotometer to explore the mechanism on which uranium was adsorbed by the C-reagent that played the main role in this adsorption of uranium in resin. Preliminary results were obtained: (1) The characteristic absorption peak of C-reagent was at 400 nm, the absorption peak of H_2N-C-O^- appeared at 465 nm, and the absorption peak of H_3N^+-C-OH did not appear in a visible wave length. Acid dissociation of C-reagent was nearly at pH $\doteq$ 8.5, while basic dissociation was presumably at pH $\doteq$ 1.5 or so. Most of the undissociated C-reagent and a part of H_2N-C-O^- existed at pH $\doteq$ 8; (2) The adsorption peak of C-reagent was independent of pH at 437 nm of the wave length in the solution; (3) At pH > 9.5 and pH < 6.5, the C-reagent did not react with uranium, at pH $\doteq$ 8 a part of the C-reagent reacted with uranium. It was thought possible that the C-reagent reacted with $UO_2(OH)_x^{(x-2)-}$. As for the actual reaction, the mode needs further study.

9717
CSO: 4009/242

AUTHOR: CHEN Zhichao [7115 1807 6389]

ORG: Prospecting Engineering Teaching and Research Office, Central South College of Mineralogy and Metallurgy

TITLE: "Several Problems in the Cement Pouring Work Procedure of Geological Prospecting"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 2, 20 Apr 81 pp 13-16

ABSTRACT: Sulfur aluminate geological prospecting cement has been successfully made through joint research efforts of Shanghai Yangjing Cement Plant, Tongji University, Central South College of Mineralogy and Metallurgy, Chengdu College of Geology, Shanghai Geological Bureau, and the Research Institute of Prospecting Technology. The Ministry of Geology has organized for its certification in Shanghai in Sep 80. For the purpose of facilitating its extension so that it may perform a greater function in protecting walls and stopping leaks in complex strata, the author presents his own viewpoints with respect to several conspicuous problems in the pouring procedure. Mainly, it is important to check the pump beforehand so that the pouring time will not be delayed due to a mishap of the pump; it is important that all the cement pulp should be poured into the drill hole within a specified time; the cement is very sensitive to temperature, which should not

[continuation of TANKUANG GONGCHENG No 2, 1981 pp 13-16]

exceed 30°C; the hardening time should not be allowed to last too long. Problems of selecting the water and cement ratio, determining the suitable time for pumping, selecting a suitable pouring technique for different geological conditions, determining the correct period of waiting for hardening, and the special processes for pouring cement in small caliber drill holes are discussed in separate sections.

AUTHOR: LI Changmao [2621 2490 5399]

ORG: None

TITLE: "Establishment of Special Centers of Testing and Experimenting in Prospecting Engineering is to Plan for a Century of Development of Prospecting Engineering Technology"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 2, 20 Apr 81 p 21

ABSTRACT: Establishing and perfecting tests and experimental conditions constitute the foundation for long range development of the technology. This should be regarded as one of the important measures for realization of modernization of the field for the purpose of determining the quality of products, providing scientific data for reasonable selection of drilling parameters, observing slurry materials under laboratory instruments to ascertain their physical and chemical properties, and simulating in the laboratory conditions of deep, high temperature, and high pressure drilling in order to understand properties of rocks in deep holes and changes in the properties of slurry and cement. The author urges the establishment of special test laboratories in 10 places of the country in the 80's to make up for existing deficiency of experimental facility of the geology departments.

AUTHOR: LIU Jiang [0491 3068]

ORG: Henan Provincial Prospecting Team No 3

TITLE: "Understandings in Improving the Useful Life of Drill Bits and Reducing the Unit Cost of Drilling Footage"

SOURCE: Beijing TANKUANG GONGCHENG [PROSPECTING ENGINEERING] in Chinese No 2, 20 Apr 81 pp 41-43, 36

ABSTRACT: The problem of the useful life of diamond drill bits affects the economic efficiency of diamond drilling, the future development of the technology, as well as the economic benefit of related workers and managers of the entire team. In the past 2 years, a series of technical and management measures were adopted to raise the useful life of a drill bit from the 21.03m of 79 to the 28.07m of 80. More importantly, as the technical procedures became reasonable, the unit cost of drilling dropped from the 97.65 yuan/m of 78, to the 74.10 yuan/m of 79, to the 68.70 yuan/m of 80. Mistakes of the past 11 years causing the average useful life of a diamond drill bit to be 10-15 m before 1978 are analyzed and the recently adopted measures which so effectively corrected the problems are described.

6248
CSO: 4009/267

AUTHOR: SHEN Chen [3088 3089]

ORG: None

TITLE: "Development of Standards for Fiber Reinforced Plastics (Glass Steel) in China"

SOURCE: Beijing JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN] in Chinese No 2, Mar 81 pp 13-14

ABSTRACT: For the purpose of promoting the work of standardization of fiber reinforced plastics in China, a Fiber Reinforced Plastics Standardization Committee was established in the winter of 80 in Qingdao City. In China, technical standards for glass steel started rather late, with the earliest draft appearing in 1965 and not all the articles of the draft were completely implemented. Through conferences in Beijing in Nov 74, in Shanghai in Dec 77, in Beijing in Sep 78, in Dalian in Oct 79, etc. the groundwork was gradually laid for the Glass Steel Standardization Coordination Conference called by Beijing Glass Steel Research Institute in Apr 80 when a standardization work plan for 1980 was formulated. Contacts with the International Standardization Organization was made, and a draft sent by the international organization was translated and reviewed.

AUTHOR: JI Gui [4764 6311]

ORG: None

TITLE: "Brief Introduction of Condition of Formulation of Standards in Metallurgical Technology"

SOURCE: Beijing JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN] in Chinese No 2, Mar 81 pp 15-16

ABSTRACT: With respect to standardization of metallurgical technology, the development in 1980 included approval or in the approving process 83 standards for refractory materials, coking products and their testing methods, iron alloys, steel and steel materials, and materials for special uses. Some of these form national standards of the State, and others are Ministry standards. These standards are described in some detail in the paper.

AUTHOR: BEI Shan [5952 1472]

ORG: None

TITLE: "Trend Toward Marsh Gas Standardization"

SOURCE: Beijing JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN] in Chinese No 2, Mar 81 p 4

ABSTRACT: Since the appearance of marsh gas as a new source of energy, in the rural villages of China, more than 5 million marsh gas tanks have been constructed and considerable experiences have also been accumulated. The Cereal Farming Committee of the United Nations asked China's Ministry of Agriculture to organize several classes in Sichuan Province to teach the technique. China's tanks belong to the first generation of sealed tanks. The second generation tanks are of reinforced concrete construction with automatic control. The third generation tanks are multiple-stage fermentation tanks, which produce more gas and a liquid raw material to make synthetic petroleum. The newer models are results of research in such industrially developed countries as England and the USA. Based upon the mature experience in the field, some nationwide conferences have been called to set standards for the tanks and accessories. Standards of Marsh Gas Stoves for Private Households is a document drafted by Tongji University and Beijing Municipal Research Institute of Public Affairs; a symposium was held in the end of 1980 to

[continuation of JISHU BIAOZHUN TONGBAO No 2, 1981 p 4]

discuss the formulation of standard tests and safety standard of such stoves. The paper proposes that for the purpose of nationwide extension of marsh gas, it is necessary to carry out standardization of the following: (1) Standards for types of tanks, construction material, structure, and construction processes; (2) Stoves and lamps; (3) Marsh gas pipes, switches, and connection devices; (4) Marsh gas bacteria strains and conditions of their culture; (5) Accessories for engines fired by a mixed fuel of marsh gas and diesel oil.

AUTHOR: None

ORG: None

TITLE: "The Quality of Standard Printing Paper is Improved This Year"

SOURCE: Beijing JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN] in Chinese No 2, Mar 81 p 18

ABSTRACT: In order to improve the quality of books on technical standards so as to prolong their useful life, reduce their natural wear, and provide a favorable condition for preserving technical information, the State's Publications Management Bureau has agreed to supply, from this year on, some better quality paper for printing technical standard books. It has been announced that offset lithographic paper of 80 g/m^2 will be used to print all standard books of 32 pages or less; No 1 letterpress paper of 60 g/m^2 will be used to replace the No 2 letterpress paper of 52 g/m^2 to print all standard books of 32 pages or more. Lithographic paper will be used to make covers of all these books.

6248
CSO: 4009/271

END

END OF FICHE

DATE FILMED

29 May 1981